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Vulnerability to Climate Change:

Gender analysis of smallholder farmers' contextual vulnerability,

A case study in Taita Hills

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Climate change is increasingly bringing new environmental and climate-related challenges, which all will notably affect the agriculture sector. Geographers have addressed the topic traditionally from the environmental perspective, but more recently, the focus has also been on the social outcomes of climate change. One of the central topics in the climate change research continues to be the analysis of the level of vulnerability to climate change. Despite its central position, the concept of vulnerability has remained vague and undefined. Most often it includes the elements of exposure, sensitivity and adaptive capacity, and they form the core of the vulnerability analysis both for Geography and for other fields of research. Common outcome of the vulnerability analysis is an index, which can be used for measuring vulnerability level in a certain context, e.g. in the agriculture sector, as in this research context. The main focus is often on two former elements, exposure and sensitivity, which means that the socio-economic context is left for a lesser examination, even though it holds aspects that can determine individual's possibility to cope and adapt with the changing environmental condition and therefore form the base for their level of vulnerability. Rather than examining the elements of exposure and sensitivity, this research focuses on adaptive capacity through the concept of contextual vulnerability. The analysis concentrates mainly on the elements of social and human capital arguing that these elements should have a stronger position when performing the vulnerability analysis that aims to strengthen adaptation.

This research examines the concept of vulnerability to climate change on two different levels: first on the concrete level, which builds on the experiences of smallholder farmers' perceived vulnerability, and secondly, on the discursive level, which focuses on the gendered narratives and power structures within the concept. Despite the distinction, these levels are highly linked through climate change and agriculture policies and decision-making. This research criticises the prevailing 'vulnerable women' narrative of the vulnerability discourse by examining smallholder farmers' adaptation strategies in order to see whether there are in fact some gendered differences, as it is often underlined in the global discourses.

This research builds on the post-structural methodology and examines the topic through a case-study in Taita Hills, Kenya. The key methods of the research are a semi-structured interview and a critical discourse analysis. The collected data consists of the two-headed household interviews with both female and male farmers, the single-headed household interviews with female farmers, and the key informant interviews with different stakeholders from the agriculture sector. The inclusion of both female and male farmers' perspectives from each household was noted central for performing the gender analysis of the results. The empirical part of this research forms the base for understanding what adaptation and coping strategies farmers are applying, whether the reason for applying these strategies can be explained with the contextual vulnerability concept and how well the results reflect the wider vulnerability discourse.

According to this study it is possible to argue that the elements of contextual vulnerability combined with the information regarding individuals' access to resources can form the baseline for understanding individuals' possibilities to adapt to changing environmental and climatic conditions. Outcome vulnerability analysis offers highly relevant information, but it is not alone enough for understanding the challenges and possibilities of climate change adaptation. Female and male farmers' coping and adaptation response strategies did not differ notable, which supports the criticism of the gendered nature of vulnerability discourse. The vulnerable women narrative does not reflect female farmers' agency and centrality in the agriculture sector. The discourse should be corrected towards addressing structural challenges that can place people to vulnerable position rather than enforcing the gendered narrative of the vulnerable women, whose adaptation and coping strategies are left for lesser attention.

Avainsanat – Nyckelord – Keywords
Adaptive capacity, agency, agriculture, climate change, contextual vulnerability, discourse, gender analysis

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Ilmastonmuutos tuo mukanaan kasvavissa määrin erilaisia ympäristöön ja ilmastoon liittyviä muutoksia, jotka vaikuttavat huomattavasti maatalousektoriin. Maantietelijät ovat perinteisesti keskittyneet tutkimaan aihetta luonnontieteellisestä näkökulmasta, mutta nykyisin fokus on siirtynyt myös ihmiskeskeiseen tutkimukseen. Yksi tärkeistä ilmastonmuutokseen liittyvistä tutkimusaloista on sen vaikutusten merkittävyyden arviointi, jota varten käytetään usein haavoittuvaisuus -konseptia. Keskeisestä asemasta huolimatta, kyseessä olevaa kontekstia tai sitä ilmentäviä indeksejä ei ole pystytty määrittelemään tyhjentävästi, vaan niiden sisältö vaihtelee suuresti eri tutkimussuuntausten välillä. Haavoittuvaisuus -konseptissa useimmiten käytetyt elementit mittaavat muutokselle altistumisen määrää, tutkittavan kohteen herkkyyttä muutoksia kohtaan sekä mahdollisuutta sopeutua. Huomio keskittyy usein pääasiallisesti kahteen aiempaan osa-alueeseen. Tässä tutkimuksessa tarkastellaan pääasiallisesti sopeutumiskykyä sosiaalisen- ja ihmispääoman käsitteiden kautta, jotka jäävät usein liian vähälle huomiolle haavoittuvaisuus-analyysissä. Näitä elementtejä varten tutkimuksessa sovelletaan kontekstuaalisen haavoittuvaisuuden käsitettä.

Tämä tutkielma tarkastelee haavoittuvaisuus -konseptia kahdella eri tasolla: konkreettisella, joka käsittää pienviljelijäkotitalouksien koetun haavoittuvaisuuden tarkastelun, sekä diskurssi-tasolla, joka kuvastaa konseptin sisäänkirjoitettuja sukupuolittuneita rakenteita ja valtasuhteita. Työssä vertaillaan näiden kahden eri tason suhdetta toisiinsa tarkoituksena ymmärtää, vastaako diskurssi-tason kuvaus kotitalouksien kohtaamia realiteetteja. Erittelystä huolimatta tasot ovat päällekkäisiä ja vaikutuksessa toisiinsa. Diskurssi-taso kuvastaa haavoittuvaisuus -konseptin sisäisiä narratiiveja ja niiden ongelmallisuutta, jotka vaikuttavat maatalous- ja ilmastopolitiikan kautta konkreettisen tason haavoittuvaisuuteen.

Tämän tutkimuksen metodologiaa pohjautuu post-strukturaaliseen tutkimukseen. Työ on tapaustutkimus Taita Hillsin alueelta Keniasta. Keskeisimmät käytetyt menetelmät ovat puolistrukturoitu haastattelu sekä kriittinen diskurssianalyysi, jota hyödynnetään gender-analyysin toteuttamisessa. Työssä käytetty haastatteluaineisto koostuu kahden henkilön kotitalouksista, joista haastateltiin sekä nais- että miesviljelijöitä, yhden henkilön kotitalouksista sekä avaininformanttien haastatteluista. Sekä mies- että naisviljelijöiden haastattelu samasta kotitaloudesta olisi erityisen keskeistä menetelmän kannalta, sillä se muodosti vahvan pohjan gender-analyysille. Tutkimuksen empiirisen osuuden perusteella on mahdollista tarkastella millaisia sopeutumis- ja reagoimiskeinoja pienviljelijät käyttävät, voiko heidän olemassa olevia mahdollisuuksia selittää kontekstuaalisen haavoittuvaisuuden konseptin kautta, sekä onko tapaustutkimuksen tulokset linjassa laajemman haavoittuvaisuus -keskustelun kanssa.

Tutkimuksen myötä on mahdollista todeta, että tämän otannan puitteissa kontekstuaalinen haavoittuvaisuus yhdistettynä tietoon käytössä olevissa resursseista ilmentää hyvin yksilön mahdollisuuksia omaksua erilaisia keinoja mukauttaa pienviljelyään muuttuviin ilmasto- ja ympäristö -oloihin sopivaksi. Ympäristöllisiin tekijöihin keskittyvät haavoittuvaisuus -analyysit ovat tärkeitä, mutta yksistään ne eivät riitä ilmentämään haavoittuvaisuuden juurisyitä, jotka usein ovat keskeisiä sopeutumiskeinojen omaksumiselle. Haastatteluissa ilmentyneet sukupuolierot eivät anna ymmärtää, että naisten haavoittuvaisuus olisi merkittävästi suurempaa kuin mitä miesten, sillä heidän sopeutumiskeinoissaan ei ollut merkittäviä eroja. Näin olleen voidaan todeta, että haavoittuvaisuus -diskurssin pitäisi rakenteellisten epätasa-arvon ongelmien lisäksi selkeämmin korostaa naisviljelijöiden toimijuutta. Haavoittuvat naiset -narratiivi ei ilmennä naisviljelijöiden keskeistä toimijuutta maataloussektorilla. Keskustelua pitäisi ohjata käsittelemään rakenteellisia ongelmia, minkä johdosta henkilöt voivat olla haavoittuvassa asemassa sen sijaan, että haavoittuvaisuus liitettäisiin osaksi yksilön ominaisuuksia.

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Diskurssi, gender analyysi, ilmastonmuutos, kontekstuaalinen haavoittuvaisuus, maatalous, sopeutumiskyky, toimijuus.

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Content

Abbreviations

CCAP	Climate Change Action Plan
CDS	Critical Discourse Studies
CSA	Climate-Smart Agriculture
ECOSOC	Economic and Social Council
GAD	Gender and Development
GDI	Gender Development Index
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GII	Gender Inequality Index
GINI	Income inequality, Gini coefficient
GNI	Gross National Income
GOK	Government of Kenya
HDR	Human Development Report
IHDI	Inequality Adjusted HDI
IPCC	Intergovernmental Panel on Climate Change
KNBS	Kenya National Bureau of Statistics
LDC	Least Developed Countries
MDC	Medium Development Countries
MDG	Millennium Development Goals
NGO	Non-governmental organization
SES	Social-environmental systems
SHH	Single-headed households
THH	Two-headed households
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
WED	Women, Environment and Development

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1. Introduction

Climate change continues to bring great challenges for the agriculture sector altering the level of food security. Rural development depends on societies' ability to adapt their socio-ecological systems to changing environmental conditions. Faced with these changes, countries are required to have strategies for adaptation or for preventing negative impacts of climate change and variability. In order to define what areas will have the most severe impacts and what response strategies people can have in these areas, it is often necessary to perform a vulnerability assessment. In this context, areas can be understood to reflect either geographical location or different sectors of society, i.e. agriculture, economic, infrastructure. Vulnerability assessment is an important method when analysing impacts of climate change on agriculture. Generally speaking, vulnerability assessments always aim at understanding and describing the root causes of vulnerability; which groups are in the most disadvantaged position and what measures should be taken to reduce risk and increase coping and adaptation. Despite of its centrality, vulnerability concept is highly debated and there is no scientific consensus regarding its definition, measurements or utilization. This results in division of the content of vulnerability assessments and research, whereby applied concepts, methods and materials might be conflicting with each other even though they all work under the same concept.

Vulnerability concept should be perceived as operating on two levels. First of all, it is ideally a measurement of actual and concrete challenges that people are facing in the real world. It reflects realities of people working in the agriculture sector, who in this research context are most often smallholder farmers who have fewer possibilities for adapting their farming practices. Vulnerability assessments are not only performed in agriculture sector, but they are also commonly applied in other sectors, such as fisheries, forestry and pastoralism. In this context, the focus is only on agriculture sector. Simultaneously, vulnerability as well as climate change as concepts are used in discourses with political aims, agendas and in-written power structures. Discourses shape people's understanding of the world and define what subjects are deemed important and worth discussing. In the context of climate change and vulnerability, this can mean that by seeing climate change mainly as environmental threat with material impacts, the applied responses often tend to be techno-scientific with little regard to socio-political aspects or social structures of inequality. Following this, vulnerability assessments also often are rendered to cover only either environmental hazards or individual's resources rather than inspecting wider structural or historical inequalities that can hamper possibilities to cope and adapt to changes. Partly because of these prevailing structural inequalities,

vulnerability discourses often focuses only on the narrative of vulnerable women, leaving conflicting stories for lesser attention. Due to women's disadvantaged position, which is unarguably most often true, women's position as farmers is rendered into victims rather than acknowledging their position as central actors in agriculture regardless of the structural challenges. I argue that vulnerability and climate change discourses do not reflect the nuanced realities of female and male farmers, which results in a dichotomy of gendered narratives of women's and men's roles and agencies.

To avoid inherent vagueness of vulnerability assessments, this research focuses on examining elements of contextual vulnerability thereby leaving environmental elements of exposure and sensitivity with less emphasis. Contextual vulnerability covers elements of adaptive capacity, such as social and human capital, social networks, and agency. These aspects are highly interconnected and as an entity, they can be used for reflecting an individual's opportunities for coping and adaptation. Farmers' perceived challenges and opportunities are analysed in a broader socio-political and economic context, which emphasises the importance of lived structures. Through gender analysis of farmers' contextual vulnerability, I examine the role of individuals' characteristics and social relations in explaining their preferred coping and adaptation responses. I argue that despite the central role that female farmers have in guaranteeing food security, they do not possess the same authority than the male farmers, which becomes apparent in the decision-making processes and gender dynamics within households. This research states that there is a need for understanding the 'strategic' structures of vulnerability without reinforcing the stagnated and harmful power structures. In accordance with this, Farhana Sultana writes that: *"Although there is increasing attention to the fact that there are varying gendered differences in vulnerabilities in any context, not all women are equally vulnerable, even if their gender locations often make them as a group more vulnerable to various forces and systems."* (2013, p. 377).

This research approaches the question of contextual vulnerability through a case study of smallholder farmers in the Taita Taveta County in Kenya. Kenya's rural development highly depends on agriculture sector and its sub-sectors. Most often food producers are smallholder farmers: up to 70 percent of all the agriculture production is accounted as smallholder farming (Government of Kenya, 2010). On the individual level, this often means that farmers' possibilities to adapt are limited due to their inadequate access to agriculture-related resources. Agriculture continues to be a main source of income for a large part of the population, which creates a high dependency of its productivity. Therefore, it is of high importance that smallholder farmers' possibilities and challenges for response strategies are well understood and reflected on the official agriculture and climate change policies.

Importance of this research is rooted in the concrete level of smallholder farmers' experiences and in the possibility of receiving valuable insights for the global vulnerability discourse. At large, this research aims at challenging the biased narrative of vulnerable women within climate change and vulnerability discourse by contrasting it with the smallholder farmers' experiences of perceived vulnerability. Throughout this research the emphasis is on pointing out how the discourses shape our understanding of the climate change and of vulnerability. Vulnerability to climate change is simultaneously a concrete reality but also a structure conflating multiple socio-economic levels. If vulnerability assessments fundamentally aim at increasing individuals' ability and possibilities to adapt, it is crucial to consider broader contextual challenges in addition to individual's socio-economic background. By describing the agency and importance of the female farmers for food security and their multiple means for adapting to climate change, it is possible to point out how the narrative of vulnerable women portraits a biased picture of the reality, which is ultimately the main research problem of this paper. Through the case study, this research aims at unfolding how female and male farmers' adaptive capacity is constructed through contextual vulnerability, and thereby this work strengthens the body of criticisms aimed towards vulnerability discourse. Research questions take a critical approach towards chosen conceptual framing, aims at unveiling biased narratives through a gender analysis and finally, examines the created discourses on different scales from local to global.

Research questions:

1. How relevant is the concept of contextual vulnerability when analysing farmers' possibilities to adapt to climate change?

    1.1 Does it have any explanatory value in respect to perceived vulnerability?

2. What kind of coping and adaptation strategies farmers have?

    2.1 Are there any gendered differences in these strategies?

3. What linkages and disconnections appears between local and global discourses regarding contextual vulnerability?

This research consists of both primary and secondary data, of which discussion order and relation to each other is presented in Fig.1. This work entails global and local level discourses of climate change and vulnerability, which present the theoretical framework and secondary data of the research (dotted line in Fig.1), and empirical research of contextual vulnerability of smallholder farmers' vulnerability, which present the primary data of the research (solid line). Local to global scaling of the topic allows comparing secondary and primary data through critical discourse analysis. In order to examine gendered structures of vulnerability, the research method applies gender analysis for conducting household-level interviews so that both female and male farmer of each household are interviewed. Interviews were semi-structured for the purpose of gaining comparable data while keeping responses open for additional point of views and experiences. Interview data was collected from four villages within a same agro-ecological zone with semi-random sampling method. Semi-random sampling method was applied for guaranteeing differing socio-economic backgrounds of the participants. As a supplementary data, the research materials also include single-headed household interviews and key informant interviews from the agriculture sector. Due to a relatively small sample, this research does not aim at creating a presentative analysis but rather seeks to create new insights to the broader discussion.

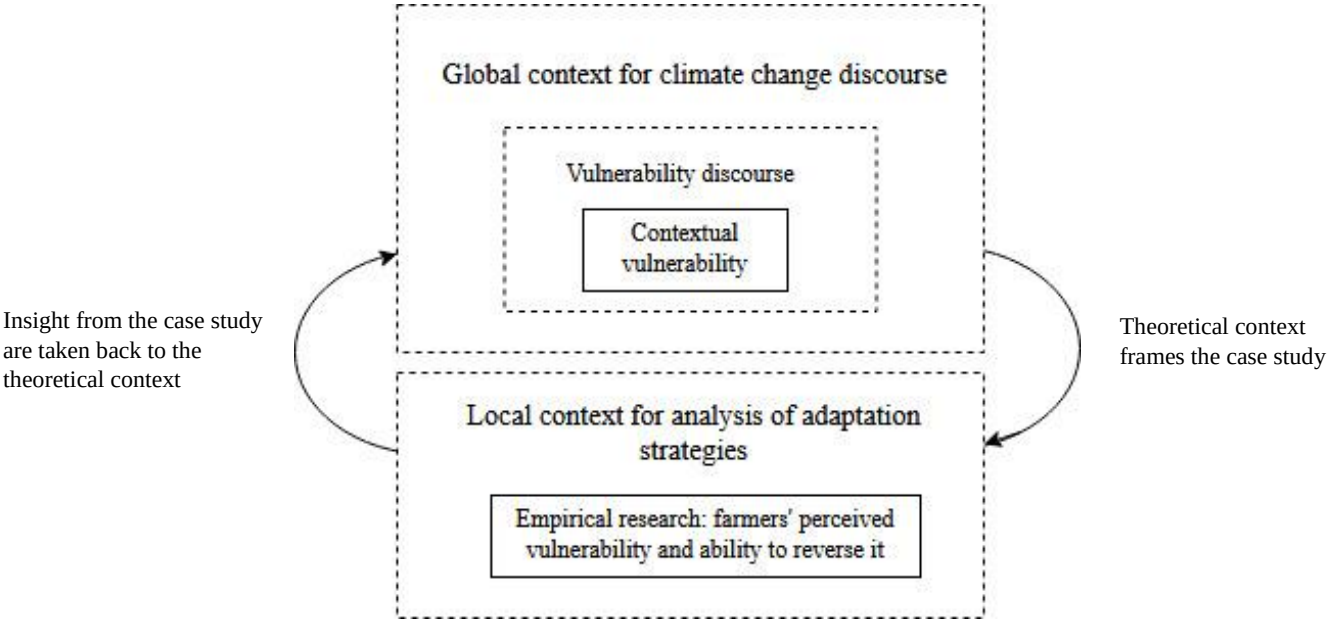


Figure 1. Secondary data and primary data of the research. Themes are presented in the same order as they will be discussed throughout the research. *Source:* Author

2. Positioning the research

2.1 Climate change and agriculture

There is a scientific consensus that climate change refers to changes in climate over time due to both natural variability and as a result of human activity. To be more specific, climate change refers to a change in the average annual temperature in at least 30 years period but also to various climate related alteration over the time period that can be statistically identified (Dessler, 2016; IPCC, 2014). Intergovernmental Panel on Climate Change (IPCC) states that climate variability is variation in the mean state or other statistics on temporal and spatial scales beyond individual weather events (IPCC, 2014). Alterations can be for instance hydrological, e.g. droughts or floods, sea-level rise or increase in extreme weather events. In contrast to definition of IPCC, the United Nations Framework Convention on Climate Change (UNFCCC) confine climate change in its Article 1 to

"a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods." (UNFCCC, 1992, p. 7).

Anthropogenic climate change refers to climate change that is a consequence of the greenhouse effect caused by human activity. Most scientists consider that current climate change is anthropogenic. IPCC performs climate change related assessments that provide a scientific basis for governments. They present projections of future climate change scenarios that often work as base for policies on the global level without more country specific details (Dessler, 2016; Füssel & Klein, 2006).

Climate change causes major challenges in the agriculture sector. Changes in temperature, increased amounts of insect pests, and worsening water-food nexus, i.e. dry spells and floods or changing rain patterns are becoming more frequent and severe. All these changes can potentially decrease crop yields and livestock numbers turning food production more unstable (FAO et al., 2010; Allouche, 20111; Whitfield, 2016). Households, especially among smallholder farmers, depend strongly on agriculture, which productivity can vary greatly due to climate variability. Agriculture, and more specifically questions concerning availability, access, utilization and stability of food production form the bases for analysing level of food security (ibid.). Climate change and vulnerability assessments are embedded in food security research, but the very concept of food security *per se* is more nuanced and has interlinkages towards wider health, nutrition, socio-economic and political factors that are

shaped by questions of security and gender (for further discussion, see Kakota et al., 2011; Ulrichs et al., 2015). Even though my research can be seen as linked to food security research, the main interest areas are within vulnerability theory and research.

When talking about climate change, two fundamental responses that often come up are mitigation and adaptation. Mitigation refers to reducing of the greenhouse gas emission (GHG) and adaptation refers to the wider range of activities that aim to adverse the effects or to create new coping strategies for stakeholders in agriculture sector. Mitigation has been in the centre of the climate change discourse, as it allows countries to reduce the impacts of climate change on wider scale, whereas adaptation measures are more limited to local actions. Mitigation actions take longer time to have actual changes on the global level while adaptation programmes can effectively enhance local systems (Füssel & Klein, 2006, p. 304). Amidst mitigation and adaptation discussion the debated question is which one is more effective to reduce climate change impacts (Bisaro et al., 2010). Whether one should focus on specific interventions or measures that address the wider context is under constant scrutiny and countries often perform both actions. The question is also political, as the Global South has not contributed to climate change in terms of the GHG as intensively as the Global North has, and therefore countries in the Global South can arguably focus more on the adaptation side.

In order to carry out analysis for the adaptation measures, one has to consider the socio-cultural context and how the impacts of climate change differ between groups (Bryan et al., 2017). One of the recent development trends that aims at answering this question is concept of climate-smart agriculture (CSA), which intends to achieve sustainable agricultural development. All three aspects of sustainable development (economic, environmental and social) are integrated in the CSA approach which aims to enable food security in changing climate conditions by combining mitigation and adaptation measures (Nelson & Huyer, 2016). Many countries are beginning to adopt the CSA approach as one possible solution to climate change.

2.2 Gender and climate change, why does gender matter?

Climate change in the context of agriculture and food security does not diminish one's chances equally, but in fact, has gendered outcomes that can fortify inequalities and gender gap in agriculture (Sultana, 2013). *Gender* does not simply refer to one's sex but to more nuanced qualities or characteristics that are often understood either as feminine or masculine. These characteristics can be culture related, but there also exists many globally approved norms that affect one's daily life. As a result, domestic tasks or societal possibilities can be *gendered,* meaning that there exist gender-related norms that create boundaries and assumptions of men's and women's responsibilities. *Gender relations,* on the other hand, approaches power structures formed by many social aspects along the gender, e.g. age, class ethnicity or religion (Rose, 1993; Dankelman, 2010; Sultana, 2013; Jost et al., 2015) , which can all be studied by using the concept of intersectionality (see Valentine, 2007; Thompson-Hall et al., 2016). For post-structuralism and social constructivism, gender is above all understood as a social construction, which gets manifested in gender roles and explains and enforces social structures.

Women play a major part in agriculture which is one of the worst hit sectors of climate change. Agriculture is the largest employing sector for women in Oceania, South Asia and Sub-Saharan Africa. Especially in the latter, agriculture employs 54.9 % of women. In the least developed countries (LDC) 79 % of women report agriculture as their primary source of income. In total, women form 43-60 % of the total workforce in agriculture (FAO et al., 2010). The gender gap in agriculture describes prevailing inequalities between men and women. Inequalities can take place in all the aspects across resources and assets as well as capacity, participation in decision-making, training or information sharing (Huyer & Campbell, 2016; Jost et al., 2015). These are the same factors that interplay in vulnerability assessments, alter food security and should be included in climate-smart agriculture (CSA) approaches.

Many scholars have argued that because of gendered nature of use, access, control and knowledge of resources, any changes in environment and produced natural resources will affect women and men's livelihoods differently (Dankelman, 2010; FAO et al., 2010; Kakota et al., 2011; Macgregor, 2010; Sultana, 2013). It is also notable that regardless of worsening ecological conditions, gendered household tasks, e.g. fetching drinking water and fire food, continue to be suitable tasks only for women (Dankelman, 2010; Jost et al., 2015; Sultana, 2013). Despite of this understanding, the emphasis of the climate change research has been on the material impacts and how one can adapt to

the changing conditions. As a result, responses and main solutions are often considered to be techno-scientific where gender is an irrelevant factor (Macgregor, 2010; Ravera et al, 2016). Underlying power relations and discursive framings of climate politics have not received as much attention as should have, according to Macgregor (2010, p. 224).

Climate change and its relation to gender has been studied along different brands of schools and social organization since the mid-1970s (Ravera et al., 2016). Ecofeminism, Women, Environment and Development (WED) or Gender and Development (GAD) are examples of organizations, which focused on the gendered nature of climate change. Ecofeminism was a school of thought that concentrated on an intrinsic relationship between the environment and women arguing that whereas men were closer to culture, women were closer to nature. Later on it was criticized that ecofeminism failed to address power relations and economic differences because of the concentration on ideological arguments (Dankelman, 2010). WED entailed ideological work but focused more on advocating women's participation in policy-making and planning. GAD moved the focus from women to gender and worked towards gender equity. All these movements had an understanding of women as a homogenous group that was later criticised strongly (Ravera et al., 2016, p. 240). Feminist theory of intersectionality has enriched research of social factors and power relations, whereas queer, masculinity, and disability studies have deepened the understanding of norms and their construction (Kaijser & Kronsell, 2014).

Regardless of this understanding, most of the climate change debates have remained gender blind (Dankelman, 2010; Thompson-Hall et al., 2016). One of the problems in gender and climate change debates is the tendency to rely on sex-disaggregated categories of 'men' and 'women' as the main explainer when analysing people's abilities to adapt for the climate change, with the in-written assumption of vulnerable women and less vulnerable men (Thompson-Hall et al., 2016, p. 373). As Macgregor concludes, it is a paradox that women are simultaneously central actors of the climate change and alienated from being implicated in the solution (2010, p. 232). Women are treated as vulnerable victims but also to be naturally in charge of protection of the environment as their families' livelihoods depend on it. This can lead to a reliance on women's unpaid labour among development projects, where "women only" narratives create a controversial image of a victim and a solution, which ends up increasing women's work load without proper acknowledgment for it (Nelson e al., 2002; Dankelman, 2010; Sultana, 2013; Jost et al., 2015). In the worse cases, adaptation projects without gender-sensitivity can further disadvantage women's conditions (Bryan et al., 2017; Kaijser & Kronsell, 2014), potentially resulting in maladaptation, where the situation degrades from the

starting point. Gender as an aspect is therefore essential when mapping the working context but it comes problematic if it is applied only through stereotypic assumptions of women's and men's roles.

Gendered inequality and the lack of gender sensitivity have been tried to correct with *gender mainstreaming*. Gender mainstreaming refers to attempt to involve gender perspective into institutions, programmes and analysis on multiple levels of work. This should lead to change in the quality of work and the work itself (Dankelman, 2010). Despite being strongly advocated, gender mainstreaming has proven to be difficult, for instance due to the lack of available gender-disaggregated data or the problematic word 'gender' itself, which has been incorrectly taken to refer only to women in some contexts (Thompson-Hall et al., 2016; Bryan et al., 2017). Additionally, gender mainstreaming has had a tendency to be added as an afterthought to development project within many sectors, such as agriculture or energy whereby it does not serve its purpose (Denton, 2002; Skutsch, 2002; Cannon & Müller-Mahn, 2010).

United Nations (UN) works as a base for constituting international agreements, from which principles and policies for addressing the gendered dimensions of climate change have also been drawn (Dankelman, 2010). International agreements on climate change are difficult to form because of the multiple components involved in it, e.g. energy, politics, transport, markets, human rights and many other aspects from different scales. Thus, any agreements on climate change must first be outlined in many other agreements and instruments. Climate change as well as gender equality are both cross-cutting issues that cannot be solved separately from the essential arenas of development (ibid.). The first breakthrough for international environmental policy as well as for gender equality was in the Rio Conference in 1992. The Rio Conference or the Earth Summit, as it is mostly recognized, produced the first major UN document that comprehensively included women's roles and positions and referred to the importance of participation and decision-making among many other things (Dankelman, 2010, p. 202). A couple of years later, the UN Economic and Social Council (ECOSOC) agreed on mainstreaming gender into all policies and programmes of UN system in 1997, and reaffirmed the conclusion again in 2005 in Resolution 2005/31 (ECOSOC, 2005). This Resolution 2005/31 states that the incorporation of a gender perspective into operational mechanisms is a globally accepted strategy and expresses a concern for remaining gaps between policy and practice (ibid.). Amidst agreements concerning importance of gender mainstreaming, UNFCCC have often failed to mention 'gender' or 'women' in its frameworks and other policy formulations (Skutsch, 2002). Many of the UN instruments, such as resolutions, international agreements and other forms of 'soft' law, lack the mechanisms of robust implementation and compliance, especially if compared with instruments used

for addressing more traditional security threats, such as war and high crimes. Despite this criticism, UN agreements have normative power that shapes political and developmental landscape (Dankelman, 2010, pp. 208–209).

2.3 Adaptation strategies: resilience, adaptation and vulnerability as key concepts

As the focus of this research is on adaptive measures rather than mitigation measures, the following chapter will briefly discuss three key concepts related to adaptation strategies. As concepts, vulnerability, resilience and adaptation are highly linked to each other with some distinguishing aspects (Adger, 2006). Resilience and vulnerability research both concentrate on social-ecological systems (Adger, 2006; Turner, 2010), where former measures magnitude of disturbance and later one level of possible harm. Adaptation, on the other hand, aims at adjusting to the changed conditions (Ribot, 2011). Out of these three concepts, vulnerability can be argued to be the most diverse but also debated concept. Because of their central position in climate change discourses, it is crucial to understand their meaning and relatedness to each other even though the focus of research would only be on one of the concepts.

Resilience thinking originates from ecological sciences as it describes ecosystems' persistence and change (Gallopín, 2006; Turner, 2010; Joakim et al., 2015; Taylor, 2015). Despite its origin, the concept of resilience is also applicable to social systems, where it reflects the persistence of systems and their ability to absorb change, reorganise and retain same function and structure (Gallopín, 2006). Joakim et al. (2015) describe resilience as resistance, recovery or as creative transformation. Resistance definition raises from its ecology origin describing a system's capacity to endure stress and change. Recovery, on the other hand, refers more to the hazard literature as it understands resilience as a capacity to recover and function in a post-disaster or post-crisis condition. Lastly, resilience as creative transformation examines a system's capacity to increase functionality of a community after climatic stressor (Joakim et al., 2015, pp. 113–114). IPCC defines resilience as a capacity to cope with hazardous events, to respond so that essential functions can be maintained while the capacity for adaptation, learning, and transformation is also continued (2014b, p. 5). In its definition, IPCC combines all the elements discussed above.

Resilience and its definitions are argued to interlink strongly with definitions of vulnerability (Gallopín, 2006; Joakim et al., 2015). Turner argues that resilience thinking underlines the systemic characteristics that strengthen a society against disturbance, whereas vulnerability seeks to identify its weakest parts that are the most affected by a perturbation (2010, p. 537). Gallopín (2006) refers to resilience and vulnerability research literature by arguing that the fundamental difference between vulnerability and resilience is that resilience refers to the capacity of society to recover (i.e. internal properties of the society without exposure to perturbations), whereas vulnerability refers to the capacity to preserve the structure of the system. They are argued to be complementing theories that work as flip sides of each other. Resilience can also be used as a frame for adaptation measures, meaning that adaptation can help a system to be more resilient (Joakim et al., 2015). However, it is important to be able to define what is meant by a resilient system and whether it is a desired condition for a society. In its very nature, resilience concept remains to be highly political as it sustains decisions of what is being sustained and for whom (Taylor, 2015). Joakim et al. present an idea of incorporating both vulnerability and resilience concepts for framing adaptation measures; vulnerability assessment as a tool for examining political-economic structural problems and resilience as a tool for identifying solutions to move forward with adaptation measures (2015, p. 152).

The adaptation concept is widely applied in climate change debates. It reflects individuals' attempts to reduce their vulnerability in the face of climate stress (Ribot, 2011). IPCC defines adaptation as a process of adjustment against current or predicted climate and its effects. Adaptation moderates or avoids harm and it may require human intervention (IPCC, 2014, p. 5). Adaptation measures are often given a high priority, sometimes above other existing fields of policy such as poverty reduction or vulnerability analyses (Cannon & Müller-Mahn, 2010; Taylor, 2015). If the focus is on hazards, it is possible that analysis of wider sets of socioeconomic causes of vulnerability may be deemed irrelevant (Ribot, 2011). Adaptation takes place on various scales with various participant on individual and governmental level (Adger, 2003). Governmental level refers to an institutional setting where adaptive governance leads top-down approach sometimes on the expense of individual interests (Cannon & Müller-Mahn, 2010), whereas on individual level, societies and communities adapt on the bases of their social capital, which is one central element for construction of adaptive capacity (Adger, 2003). Decisions concerning adaptation are thus made on multiple levels and between various actors. Capacity to make decisions is therefore essential in terms of learning, self-organizing and cooperation between different actors and agencies. Consequently, decision-making is a process that can privilege some interests over another and therefore adaptation strategies rely highly

on acceptability of options, institutional functioning and how adaptation works in contrast to wider developmental perspectives (Adger, 2003, p. 388).

Adaptation, especially if examined through the concept of adaptive capacity, is argued to base largely on the concept of social capital (Adger, 2003; Cannon & Müller-Mahn, 2010). Adger writes that social capital consists of relation of trust, reciprocity and evolution of common rules and the role of networks. The notion of an interdependence of agents is crucial and affects to adaptation processes (2003, p. 388-389). Importantly, Adger underpins the importance of understanding culture and place specific characteristics and also how policy interventions should be sensitive towards these nuances (2003, p. 400). If compared with the definition of IPCC, adaptation processes are given more nuanced definitions in social sciences. When comparing notions of vulnerability and adaptation, points in common can be found in social capital and decision-making power. However, these definitions are not exclusive but rather require conscious framing every time.

There are lots of development projects that require performing the vulnerability assessment. Therefore, the concept of vulnerability must be carefully framed every time when conducting the analysis. The term 'vulnerability' and its assessments of climate change are central topics both in environmental and social sciences. Its definitions *per se* can be quite similar but entail different perspectives along the disciplines and thus they can follow different approaches and methodologies for the research of human-nature system interactions (Füssel & Klein, 2006; Joakim et al., 2015). Generally speaking, every vulnerability assessment seeks to understand the root causes of vulnerability; who is the most affected by the changing circumstances on different scales and ideally, to find opportunities for risk reduction, coping and adaptation (Miller et al., 2010). Vulnerability research has been diverse and shaped by many theoretical traditions, stemming from hazard studies of geophysical sciences to political ecology (ibid.). Vulnerability can be understood as a measure or a degree that reflects household's or person's capability to adverse impacts of climate change (Ulrichs et al., 2015). Among social scientists, vulnerability assessments have traditionally based on post-disaster and risk management research and focused to see how vulnerability varies in different phases of crisis (Turner, 2010). These aspects have been carefully studied especially in the work of IPCC (Oppenheimer et al., 2014), which has a central role in climate change debates, mitigation and adaptation strategies and therefore has a huge impact on the organizations (Macgregor, 2010). According to IPCC, vulnerability can be defined as:

"Vulnerability: The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack on capacity to cope and adapt. A broad set of factors such as wealth, social status, and gender determine vulnerability and exposure to climate-related risk." (Oppenheimer et al., 2014, p. 1048).

Along the different research tradition, most often vulnerability is conceptualized as exposure to external stresses or perturbation e.g. 'harm', sensitivity towards perturbation and lastly as a capacity to adapt (Adger, 2006; Engle, 2011; Gallopín, 2006). According to IPCC, exposure could be described as a precondition for vulnerability (Oppenheimer et al., 2014). Exposure and different levels of it (for instance, in the context of climate change scenarios) are required to be taken into account while evaluating vulnerability. Sensitivity can be described as a condition, where one is more likely to get exposed to perturbation. Capacity to adapt can be understood, for instance, as resources that allow one to prepare for harmful changes (Gallopín, 2006, pp. 296–297). In other words, perturbation could be a sudden drought, sensitivity could vary along more resistant crops and capacity to adapt could be increased with a possibility to use an irrigation system. These three aspects form the pillars of vulnerability assessments. Elements of exposure and sensitivity are conceived to be part of end-point vulnerability analysis, whereas adaptive capacity can be argued to be part of contextual vulnerability.

More recently, vulnerability assessments have started to contain broader aspects than just evaluation of impacts of climate change. Vulnerability can be, for instance, socioeconomic, environmental or institutional (Oppenheimer et al., 2014). Often this is achieved by including additional factors, such as socio-economic, and other non-climatic stressors of the society that can potentially affect societies' changes to adapt to the changing conditions. Widening of the vulnerability concept also increases its relevance for the decision-makers (Füssel & Klein, 2006). Despite the attempts to widen vulnerability assessments, research has often failed to acknowledge gender and how it affects one's possibilities to adopt new approaches. In previous IPCC reports, there have hardly been any mentioning of gender (Skutsch, 2002; Macgregor, 2010; Ravera et al., 2016). Gender and gender relations can form the base for roles that men and women play in climate change related adaptation and mitigation strategies. Without this knowledge, projects can end up reinforcing social structures and categorizations without challenging them (Kaijser & Kronsell, 2014, p. 420). There is a need for understanding 'strategic' structures of vulnerability without reinforcing more stagnated and often harmful power structures that leaves minorities in the weaker position. As Sultana (2013) argues in a same sense:

"Although there is increasing attention to the fact that there are varying gendered differences in vulnerabilities in any context, not all women are equally vulnerable, even if their gender locations often make them as a group more vulnerable to various forces and systems." (Sultana, 2013, p. 377).

To conclude this chapter, the following Fig. 2 presents the discussed concepts in relation to each other. As have been pointed our earlier, resilience and vulnerability concepts can be seen as interlinked, whereas vulnerability assessments can produce valuable information for the adaptation concept. Out of these three concepts, adaptation is the most recent one, which explains its position in the far right. Fig. 2 demonstrates how all of the concepts have their own focus areas while simultaneously some of the theories are overlapping, as with the more recently included theory of social capital. Listed theories can be used simultaneously for performing analysis, or they can be used individually. In order to gain robust results, one often aims to take into consideration as many elements as possible. Additionally, the outcome of the analysis varies also according to scale, time, place and space of the studied unit. The presented mind map is not definite because of the diverse nature of each concept but rather seeks to present the most prominent discourses of the topic. Due to the overlapping nature of discussed concepts, it is essential to grasp an overview of the prevailing discussion even though the focus will concentrate on the vulnerability discourse.

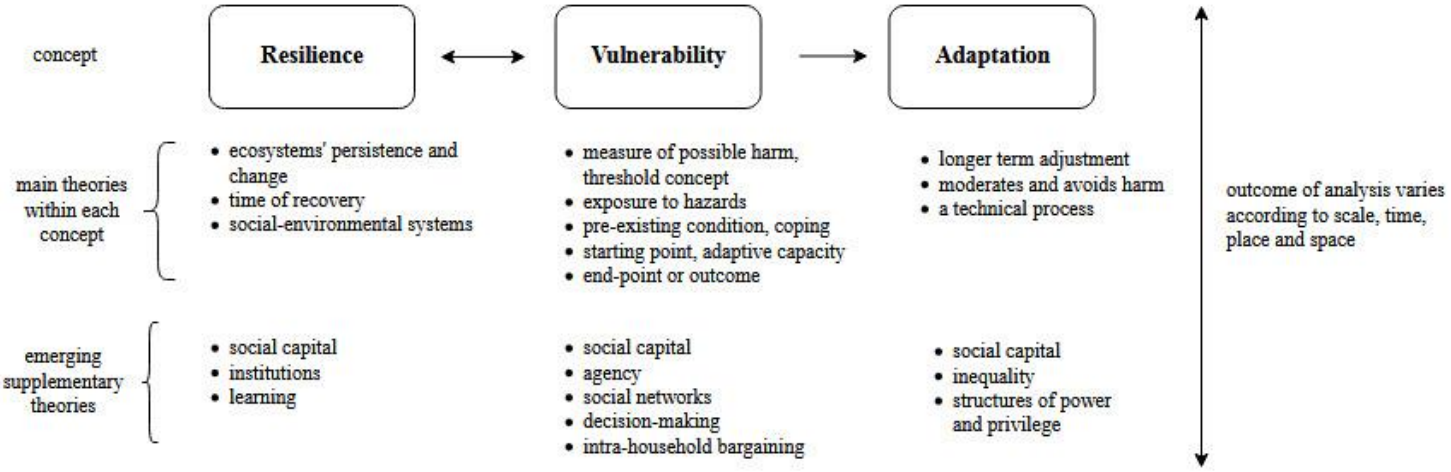


Figure 2. Mind map on coexisting theories of concepts of resilience, vulnerability and adaptation *Source:* Author

3. Framing the concept of contextual vulnerability

The concept of vulnerability has remained without a definitive framing of its content, theories or methodologies, which has allowed debate in the climate change related forums to continue. Often seemingly straightforward definition has proven to be difficult at the operational level and in vulnerability assessments studies (Ionescu et al., 2009). The main problem of the concept is that it continues to be very generic whilst it is used in many different scientific discourses. This can lead to instances where the vulnerability assessments may vary greatly between each other even though they use the same general definition (Bisaro, Wolf, & Hinkel, 2010). As discussed in previous chapter, vulnerability analysis is commonly understood to consist of concepts of exposure, sensitivity and adaptive capacity. When performing vulnerability analysis, it is very important to frame how these concepts are understood and whether the research is concentrating on all the elements or only focusing on one aspect. Thorough framing of the vulnerability concepts is often a lacking element in vulnerability research. Many assessments might refer to IPCC definition but apply completely different theoretical definitions and methodologies on empirical level (Ionescu et al., 2009; Miller et al., 2010). It is also argued, that even the research questions of vulnerability assessments can be too vague and generic if they do not acknowledge questions of scale or socio-economic systems (Turner et al., 2003; Hinkel, 2011).

In order to avoid some of the inherent vagueness of vulnerability concept, the focus of this research is on elements that construct individuals' adaptive capacity. In this research, vulnerability is framed to consist of different contexts that determine individuals' possibilities to react and cope with climate change and variability (Fig. 3). Context 1 includes ecological elements of vulnerability assessments, which are often studied through exposure and sensitivity analysis. These aspects are reflected only briefly in the research context chapter because they form the underlying rationale of the research. Without exposure to climate change and variability, there would not be need for performing vulnerability analysis. Elements of exposure and sensitivity can be seen to define society's ability to resist change and return to the original condition through different coping strategies (Gallopín, 2006). Even though concept of social capital can be used for explaining development of coping strategies (Adger, 2003), I argue that it is more relevant for longer term changes of adaptive capacity, hence its location in the figure. Context 2 presents elements related to contextual vulnerability, which are human capital, social capital, social networks and agency, which can strengthen already existing coping strategies. Despite being framed as contexts, it should be noted that elements of exposure, sensitivity and adaptive capacity occur in different geopolitical, economic, institutional and other

social structures, i.e. *macro-level contexts,* which create differences between individuals (Brooks et al., 2005; O'brien et al., 2007). It should be emphasised, that even though Fig. 3 does not include elements of asset stratification, i.e. landholding size or economic status, it is one of the most important contexts both on macro- and household -level context. As such, it is included in the analysis despite not being represented here.

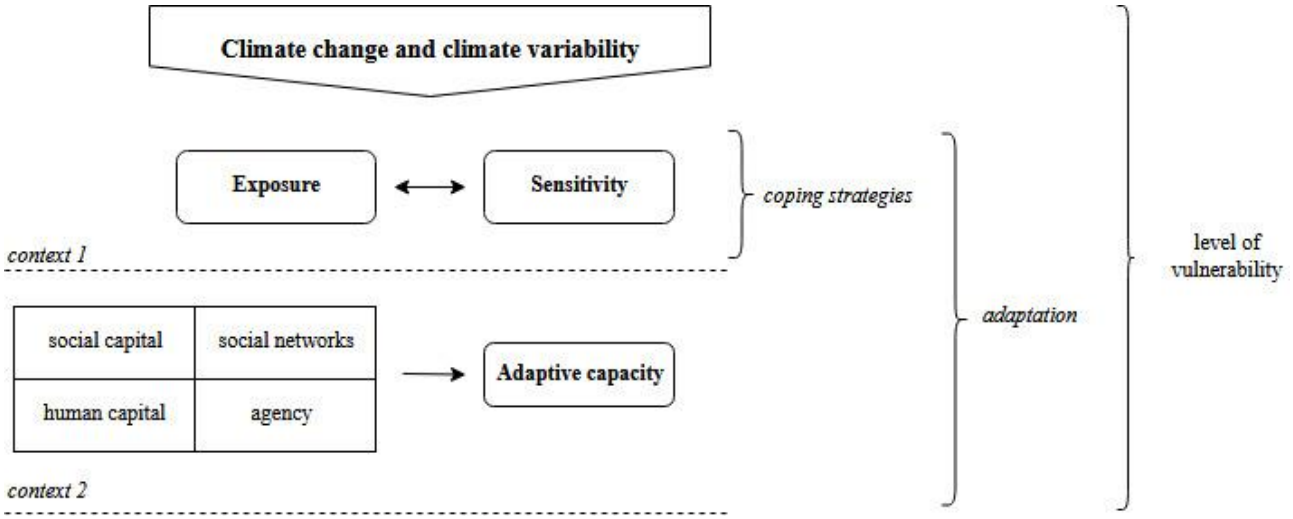


Figure 3. Conceptualising contextual vulnerability. Context 1 exemplifies biophysical elements (exposure) and sensitivity (resource dependence), which define possibilities to adapt shorter term coping strategies. These two elements are connected to each other. Context 1 covers aspects of adaptive capacity, which can enable longer term adaptation. Climate change and variability, exposure, sensitivity and adaptive capacity conflated together form the level of vulnerability to climate change. *Source:* Author.

By framing vulnerability primarily as a social context, I argue that even though the levels of exposure and sensitivity might seemingly be of the same level, the elements of adaptive capacity will determine whether an individual can have an opportunity to assimilate longer lasting adaptation strategies in addition to shorter term coping strategies (Fig. 3). Adaptive capacity as context requires also analysis of prevailing socio-economic structures. As a whole, all these elements determine the level of vulnerability, which can be studied on different scales. As my focus is on individual level, the scale of the research begins from the household-level and continues back to theoretical level. This research does not entail indices because the aim is not to produce a measure of vulnerability, but rather seek to understand what kind of structures affect development of adaptive capacity and how individuals perceive their own possibilities to adapt. For analysis of contextual vulnerability, the research entails actor oriented view that is commonly used standpoint for studying elements of adaptive capacity (Miller et al., 2010). Actor oriented perspective focuses on complex narratives of different actors and seeks to understand how their agencies are constructed.

3.1 Vulnerability as a social context

Vulnerability as a social context seeks to understand what characteristics enable individuals to have successful coping strategies and adaptation means and whether there exist some social structures that can strengthen or hamper individuals' possibilities to reach their full potential. Economic geographers argue that adaptation strategies depend mainly on individuals' adaptive capacity, which can be enhanced through capacity building (Adger, 2003; Engle, 2011). Capacity building i.e. knowledge and access to information enable people to accustom new adaptation options and actually start implementing them (Füssel & Klein, 2006). As the aim of the vulnerability assessments is to increase and enable adaptive capacity, the focus on social elements of vulnerability is well established.

Adaptive capacity is one of the central concepts in vulnerability analysis. As a concept, it is linked to both adaptation and resilience work where it can be seen to form a basis for both climate change related concepts (as can be noted from the Fig. 2). With respect to vulnerability analysis, adaptive capacity is seen to depict individuals' possibilities to adjust to changing climatic condition that alter agriculture practices (Van Aelst & Holvoet, 2017). Coping strategies aim to alleviate current challenges quickly, whereas adaptation measures are more proactive and attempt to prevent negative effects. Coping is generally deemed more negative and it can entail the notion of the lack of choice due to poverty (ibid.). However, coping strategies are necessary because the changes in climate and environment can occur rapidly. In order to examine adaptive capacity, analysis is divided into social capital, social networks, human capital and agency. These same elements form the base for empirical part of this research, which will be compared with the secondary data of theoretical background.

Despite the fact that the concept of contextual vulnerability can offers lots of possibilities, there are also many inherent challenges that should be taken into consideration. Contextual vulnerability assessment *per se* can entail normative assumptions of values and goals for societies. It can also be problematic to deem societies as 'vulnerable' as it has a negative and somewhat victimising tone. This can be seen for instance from vulnerability assessments, which scale different levels of vulnerability between dumb and smart farmers (Füssel & Klein, 2006, p. 307). Although Füssel and Klein's article is over ten years old, it reminds of the problematic nature of vulnerability discourse. In the same sense farmer might be blamed for failures of adaptation projects, as they might be lacking will to absorb new practices (ibid, for instance). Whether or not being true, these kind of arguments can take the responsibility away from the foreign implementers. Contextual vulnerability should also be understood as part of broader structures of power and privilege, as Taylor argues (2015: 7).

Although examination of these structures should be included in contextual vulnerability analysis, it can easily be rendered into analysis of individuals' presumably inherent properties that are either in the category of 'vulnerable' or 'adaptive capacity' (ibid.). When talking about these categories, Taylor emphasizes that *"(-) they are instead an expression of complex socio-ecological relations between social groups, classes and genders in which such social agents actively yet unequally seek to transform their lived environments in a given historical context."* (2015: 9). Therefore, the focus of this research is not solemnly on adaptation and adaptive capacity, but rather seeks to understand the root causes behind the construction of adaptive capacity by applying the concept of contextual vulnerability.

3.2 Social capital and social networks

Adaptive capacity is most commonly examined through a concept of social capital. The definition of social capital is debated and there are many different forms of it, but a geographic understanding of the concept of social capital argues that it consists of networks of trust and reciprocity between individuals and other norms related to social life (Mohan & Mohan, 2002; Adger, 2003; MacGillivray, 2018). As a concept, social capital is argued to be a geographic because it is always embedded in a certain time and place (ibid.). Social capital is also scale-sensitive because it is situated within macro-level structures, such as economic and political (MacGillivray, 2018). Question of scale is relevant for studying changes in social capital, varying between household-level to local or global level. It is noted that social capital and its benefits are limited by wealth and other resources because of the poverty trap and tendency to be connected to people from same economic group (ibid.).

Importantly, social capital reflects a society's characteristics and abilities. Therefore, it should be separated from human capital that refers to an individual's characteristics, such as skills and competencies (Mohan & Mohan, 2002). This research does not examine social capital as fundamentally connected to state (see Mohan & Mohan, 2002; Adger, 2003), but rather sees it as shared society's characteristics. In this research, society is reflected through farmers' connections varying from neighbouring farmers to organized groups and county-level meetings. Social capital covers actors' common beliefs, prior experiences and norms and therefore it is important for individuals' decision-making process concerning adaptation and coping strategies (Whitfield, 2016; MacGillivray, 2018). Ideally, social capital leads to collective action for pursuing shared objectives (Mohan & Mohan, 2002). Collective action requires social networks and change of information

between individuals (Adger, 2003). As Adger summarises, social networks can be seen as part of social capital either as an individual's or society's asset (2003). Social networks are sometimes argued to be part of social capital and sometimes to consist of their own conformity of social theories. Social networks can be bonding between homogenous groups (family, kinship, local) or bridging networks between heterogeneous groups (external ties, economic), and they are exclusive by their nature for outsiders (Adger, 2003; MacGillivray, 2018). However, this distinction is not always as clear as it sounds.

Social capital measurements entail differing aspects of social life, e.g. membership statistics or participation to community projects (Mohan & Mohan, 2002). Methodologies that simply rely on counting aggregate numbers do not always explain what value the membership has actually brought for the individual. As Mohan and Mohan (2002) argue, this would require individual-level data on how any forms of participation has enhanced the perceived social capital. Theories of social capital has also been criticised because of their economic rationale and over-looking of material inequalities (ibid.).

3.3 Human capital and agency

Human capital refers to an individual's set of skills and competencies (Mohan & Mohan, 2002). Knowledge and ability to implement it can be described as an individual's characteristic, but access to information can alter according individuals' position in society, e.g. political and economic structures. Traditional ecological knowledge is argued to be a central element in environmental management (Adger, 2003). Knowledge and information are linked to the decision-making as they give value for individuals' arguments (ibid.). Traditional ecological knowledge as well as more modern methods represents different knowledge structures. Individiduals construct knowledge through their own cultural and political-economic context, which results differing perceptions of the world (Whitfield, 2016; Hohenthal et al., 2018). Importantly, when analysing aspects of knowledge, often made distinction is to examine 'expert' and 'lay' knowledge separately, as they are seen to represent different realms of knowledge, especially when it comes to institutional norms (Whitfield, 2016). Human capital and agency are interlinked to each other because of the simple fact that actors use their human capital i.e. individual characteristics to exert their agency. An individual's characteristics and society's structure shape the possibilities of exerting one's agency (Wagenaar, 2011, p. 161).

To dismantle gendered differences, the focus can be turned to *agency.* Agency as a concept is linked to empowerment, or more correctly, empowerment can be analysed through agency (Ibrahim & Alkire, 2007). Briefly said, empowerment mirror individuals' capacity to make effective choices in accordance to one's values and goals (ibid.). Empowerment can be divided into more detailed categories of power, where the focus varies between an individual's personal power to power within and as a group (ibid.). Agency is described as an ability to act effectively on behalf of one's value choices (Alkire et al., 2013). The authors base their definition on Amartya Sen's concept of agency, which combines the element of acting on behalf of one's value in the favourable institutional environment (Sen, 1989). Agency can be dismantled into control over agriculture assets and to the ability to make decision over them, leadership in a community (measured as being part of a social group) and as an ability to exert voice and participate in collective action (Alkire et al., 2013). Therefore, agency is a combination of an individual's and collective possibilities and assets (Ibrahim & Alkire, 2007).

Intra-household decision-making can be said to reflect social norms that in turn create gendered possibilities to pursue new adaptation approaches (Nelson & Huyer, 2016). It is argued that women are often excluded from decision-making processes (Ulrichs et al., 2015). Decision-making and intra-household bargaining reflect an individual's power to participate and pursue her or his goals (Ibrahim & Alkire, 2007). Examining decision-making as one of key aspect of the vulnerability is well-grounded because it has a great effect on implementation of new approaches. When confronted with the problems in adaptation, the reason might be found in the disconnections of decision-making and related institutional factors (Bisaro et al., 2010). Of course, there are many reasons for programs to fail, such as the possibility of not reaching the marginalised people but those who are closer to governance institutions (Adger, 2006).

4. Research context

Kenya is located in eastern Africa (Fig. 4). Kenya's total population is around 49.0 million while its largest city and capital Nairobi has about 3 million inhabitants. According to United Nations Development Programme, Kenya is ranked among medium development countries (MDC) by the World Bank (UNDP, 2016). Table 1 summarises some central aspects of UNDP's human development report results concerning Kenya. Kenya's ranking has maintained approximately on the same level since 2010 (ibid.). Its human development index (HDI) of 0.590 positions it at 142 out of 189 countries in total. Along with other indexes, such as Inequality-adjusted HDI (0.391), Gender Development Index GDI (0.919), and Gender Inequality Index GII (0.549) it represents the country's recent structural and political development. Kenya's economy is service-based; services count for 63.4 percent of gross domestic product (GDP) (African Development Bank Group, 2014). Agriculture produces 26 per cent of Kenya's GDP annually creating formal and informal employment for the rural population (Government of Kenya, 2010). The agricultural sector in Kenya comprises many subsectors, such as crops, livestock, land, water among many other sectors. Given its high importance, agriculture is essential for the country's development especially in the rural areas. Despite the positive development trends, Kenya continues to have great challenges due to poverty, inequality and climate change.

Agriculture in Kenya is predominantly small-scale farming, which means that farmers' average land size is 0.2–3 hectares (Government of Kenya, 2010). Of the total agriculture output, the smallholder farmers produce up to 75 percent (ibid.). Smallholder farmers' sensitivity towards climate change and variability is especially high among agriculture-related resource dependent communities (Adger, 2003; Adger, 2006; Engle, 2011). The lack of resources is one of the main features that determines farming possibilities. Resources can be financial, farm inputs (manure, fertilizer, pesticide), water (rain-fed or irrigation), land (size, quality and tenure rights), labour, time and technology. The most fundamental and determining resource is income, because the level of income increases or decreases possibilities to gain access to other resources. Resource dependence can also create conflicts over existing few resources, for instance with water sources (Smith, 2008). Improvement of farming methods would often require experimenting with new farming methods or gaining access to additional land, which simply is not an option for most of the farmers (Whitfield, 2016; Van Aelst & Holvoet, 2017).

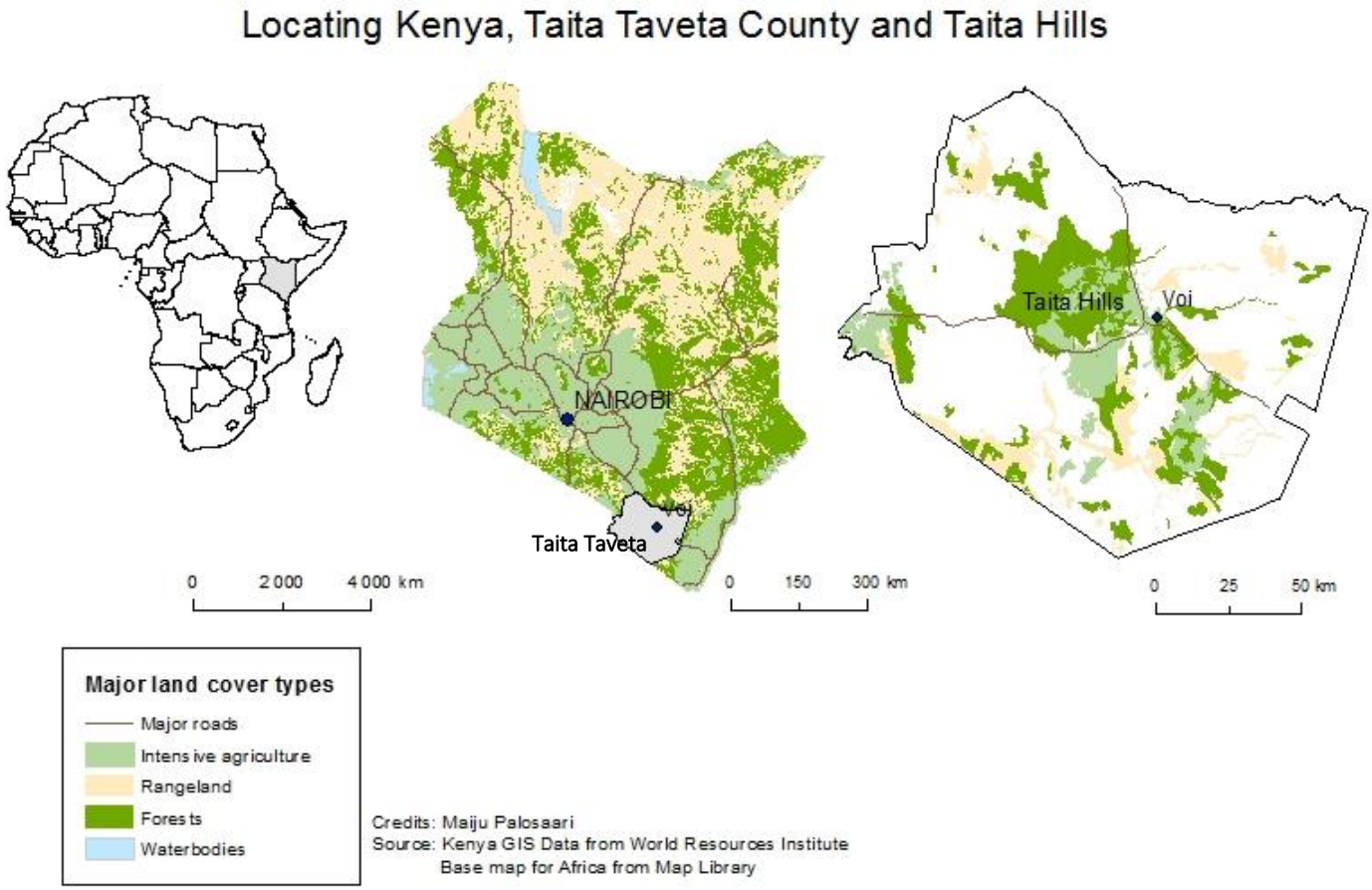


Figure 4. Locating Kenya, Taita Taveta County and Taita Hills. When reading from left to right, the grey area indicates the location of the following smaller scale area. The map presents also the major roads and agriculture-related land cover types in the area. *Source:* Author.

Table 1. Human Development Reports, Kenya. (UNDP, 2016)

	Index	*Explanation*
HDI	0.590	human development index
IHDI	0.434	HDI adjusted for inequalities
GINI	48.5	0 absolute equality
GDI	0.931	ratio of female to male HDI values
GII	0.549	inequality in achievements

Since the promulgation of the 2010 Constitution, legislative and executive responsibilities have changed so that both the National and 47 County governments have their own roles (African Development Bank Group, 2014). County governments are responsible for agricultural production while keeping them in line with the national agriculture policy (ibid.). Ngigi et al. (2017) discuss

gendered differences in climate change adaptation strategies in Kenya. They argue that there is a need for institutionalizing gender in all levels of decision-making processes. The Kenyan government has initiated the process of gender mainstreaming and they have a 'gender desk' in the Ministry of Agriculture. However, despite the recognition of women's central role in agriculture, many of the farmers' services and trainings continue to be gender blind (Ngigi et al., 2017). Ngigi et al. underline the importance of social and political capital that is strongly based on social networks. Men often have wider networks, which gives them an improved position for participating in community decision-making. According to Ngigi et al., pre-existing gender and social norms could be seen explaining the setting (2017, p. 107).

The research area is situated in the Taita Hills, which is part of the Taita-Taveta County of Kenya (Fig. 4). Taita-Taveta County's population is approximately 300 000 and it is located in biogeographical characteristics that favour agriculture. Taita Taveta County's population in 2009 was 216 992 (KNBS, 2009). Taita Hills is regarded to be part of Afromontane Biodiversity Hotspot. Important features of the area are its altitude, which varies between 600 and 2200 meters above sea level (m.a.s.l.), and a bimodal rainfall regime, which takes place in March/May-June and October-December. Agriculture is the main economic activity of the Taita community (Boitt, Mundia, & Pellikka, 2014; Mkangi, 1983). Nowadays intensive agriculture and grazing lands are the most prominent features of the environment, while remaining fragmented forests can be found in the remoted areas (Boitt et al., 2014). The most prominent ethnic group of the Taita Hills is Wataita, which means people of Taita in Kiswahili (Mkangi, 1983). Other major ethnic groups of the Taita-Taveta County are Wataveta, Wasagalla and Wakasigau, who live in Taveta, the Sagalla and Kasigau Hills respectively. The indigenous population forms the majority, up to 90 percent of the total population of the Taita-Taveta County (ibid.). Wataita people are the biggest group as they make up almost 80 percent of the indigenous population. Wataita people are originally part of the 'Bantu Diaspora', which dates back to A.D. 1300–1400. Constant migration and intermarriages created the sense of Wataita identity. The most commonly spoken language is Kitaita, the local language, but people often know Kiswahili and English as well, which are the two official languages in Kenya and therefore part of the education programme. Wataita people have traditionally lived in a strong sense of community. This was constructed and reinforced in the day to day living, starting from the close residential patterns and the agro-economic systems. It can be argued that community was imperative factor for individuals' lives in many ways. Cultivation and ownership of land, for instance, was subdivided along residential patterns between eight clans, meaning that a man without social status or relationships could not cultivate or own land. Women were not allowed to own land nor it was

possible for them to inherit it, which can be seen as one of the elements creating patriarchal society and enforcing male dominance over the society, according to Mkangi (1983, p. 33).

After the British settler economy started in begin of the 20th century, the structure of agriculture system changed notable. The agriculture system consisted of two main sectors, ranching and farming, and it was mainly oriented towards exporting of products. The farming sector was either plantation or mixed farming, where the former consisted of production of cash crops, like coffee or tea, and the latter of dairy farming together with cash crops (Mkangi, 1983). During the colonial period, different laws and regulations diminished the Africans' ownership of land and local farmers were often denied access to the most fertile lands. In the mid-20th century, the productivity of the agriculture sector was declining. The traditional African land-tenure system was considered as one of the reasons for the underdevelopment. Reforming of the land-tenure system changed from the communal way of ownership and cultivation towards the current individualised tenure system (ibid.). Despite the changes, the inheritance of the land remains to be favourable for the men even though the women can also own land nowadays. Regardless of the ownership of the land, women have arguably always worked more than men either in terms of farming or looking after the *shamba*, a farm in Kiswahili, or performing the household chores (Mkangi, 1983; Smith, 2008). Women's socio-cultural status was nevertheless considered lower than men (Mkangi, 1983, pp. 91–92). More currently due to lack of employment or other off-farm activities, men have commonly out-migrated resulting the country's highest percentages of the female-headed households (Smith, 2008, p. 50). Smith's household surveys suggest that in the 1990s, the amount of matricentric households were close to 75-80 percent of Taita homes due to long-standing migration patterns (Smith, 2008). However, men are still commonly considered to be the heads of the households and in charge of the income earned from farming, even though female farmers would be de facto responsible for farming (ibid.). One possible reason for this is that households are commonly considered as expression of men's earnings and efforts because women tend to move to their husbands' household when married, according to Smith. He argues that *"The household is thus a model of patriarchal authority that also entails an argument about the proper appropriation and distribution of wealth, the value of the past, and the nature of men and women."* (2008, p. 118–119).

The geographical context of the research area consists of four towns; Wundanyi, Ngerenyi, Mgange, and Werugha, which all belong to the same agro-ecological zone (Fig. 5). When it comes to determining the agro-ecological zone, the most prominent factors in this research context are soil, land use, aspect and slope, elevation (up to 1407 m.a.s.l.), annual average temperature (20.83˚C); and

precipitation (1390mm) (Boitt et al., 2014). Averages are calculated for the administrative division of Wundanyi, which includes the above mentioned four research sites. Fig. 5 presents the research area from a closer perspective with major land cover types and topographic variations (data for the maps was same as in Pellikka et al., 2009; Adhikari et al., 2017). Typical crops for the area are maize, peas, beans, potatoes, cabbages, tomatoes, cassava and banana (ibid.). Agriculture is mainly small scale and terraced farming due to the topography of the area. For most of the farmers, rains and few rivers are the main source of water of irrigation. In Taita Hills, climate change and variability negatively affect food production with changing rain patterns and other hydro-climatic events, such as droughts and floods (Boitt et al., 2015). Outcomes are especially severe for the smallholder farmers, whose agriculture is mainly rain-fed and the main source of income. In addition to hydro-climatic events, the increasing average temperature will enhance pest infestations, and the arrival of new insect species is already causing crop loss and a decrease of agricultural productivity (Mwalusepo et al., 2015). Combined with population growth, the demand for climate sensitive farming methods is increasing. If failed to react, the results would be growing food insecurity and severe socio-economic challenges (Boitt et al., 2015).

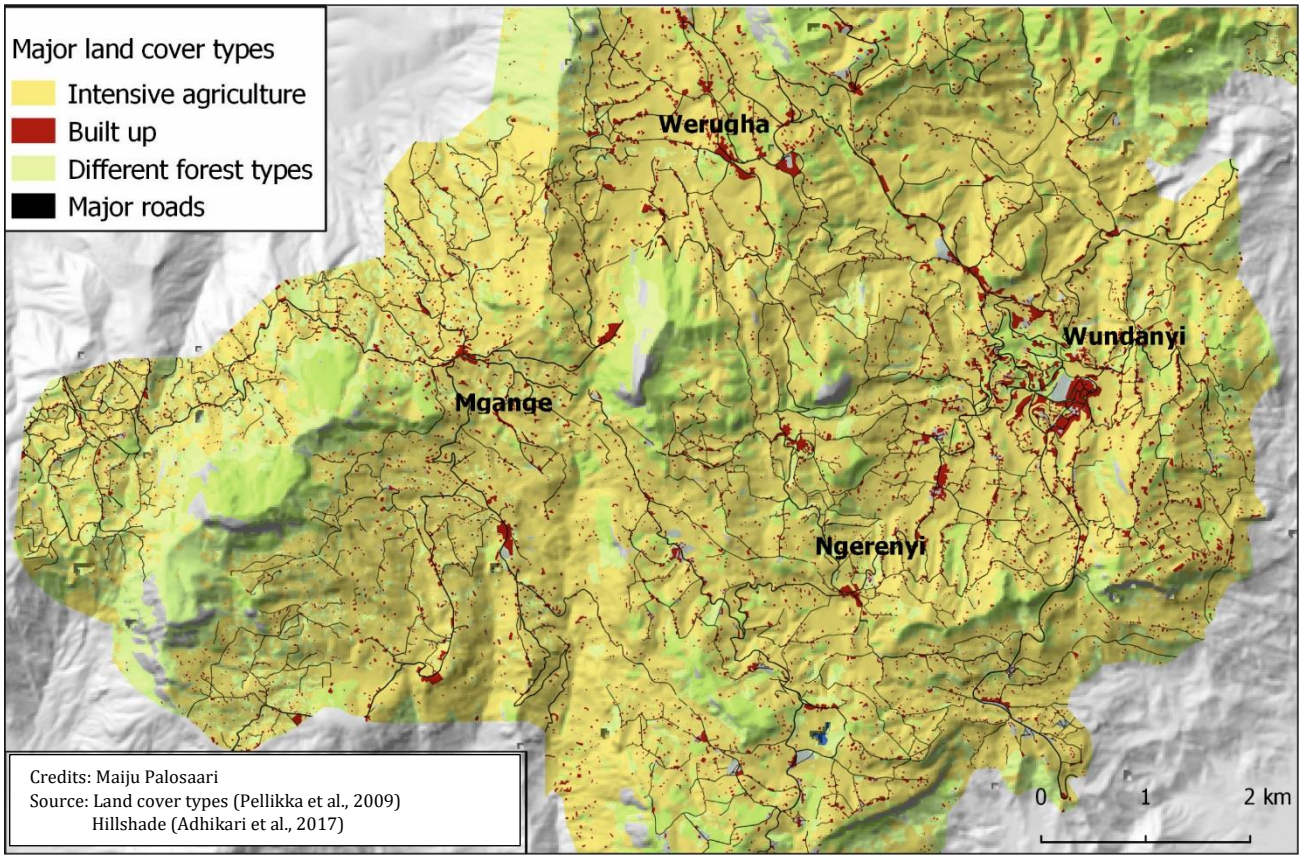


Figure 5. Agro-ecological context for the towns of Wundanyi, Werugha, Mgange and Ngerenyi. *Source:* Author

5. Research design

5.1 Methodology

The methodological context of my research can be seen to represent post-structuralism because of its focus on the discursive structures and context-related knowledge. Context refers to specific circumstances around any phenomena that are realised in a certain space and time (Cloke et al., 2004). In post-structuralism, these contexts are seen as representations of human-made structures, such as economic, political and social structures that are all cross-cut by individuals' age, gender, ethnicity etc., which results in subjective and plural understanding of the nature of reality (Hirsjärvi & Hurme, 2000; Cloke et al., 2004; Bazeley, 2013). Focusing on the context can bring more meaning and truth worthiness to a research, according to Bazeley (2013). In this research, post-structuralism allows me to question central narratives and structures of the vulnerability discourse through concentration on the individuals' experiences and perceptions of the world. This paper takes note of critical social constructivism, which can be seen affecting the understanding of gender, even though the analysis is not only concentrating on language. Post-structural methodology allows a researcher to question whether there are some dominant structures or social constructions, such as gender roles and norms that create or enhance vulnerability. One possible way of addressing dominant structures is through critical discourse analysis, which is a common stand for post-structuralist geographers (Abrahams & Carr, 2017). On the other hand, it also allows me to question how relevant structure gender is in the first place, and does it still remain important when discussing vulnerability to climate change. Wageneer argues that social structures influence social actors by setting the limits of possibilities (2011, p. 159). Post-structuralism as a methodology supports research of meaning and representations, which are common focal points for interpretive research tradition. Through this research design, my work takes a critical standpoint towards vulnerability discourse.

Reflectivity gets a wider meaning in post-structuralist research, where it is an in-written process throughout the whole research (Wodak & Meyer, 2016). Being reflective does not simply mean awareness of one's background factors that might possible affect one's research. A simple statement of the researcher's age, gender and educational background is not sufficiently deep and can easily remain only as a required side-note in the methodological chapter. Reflectivity should rather be entailed into data construction and interpretation (Cloke et al., 2004). However, it should be noted that my position as an outsider coming from the Global North affects my perspectives and also has an impact on how I am received by the research participants. Additionally, my position as a researcher

puts me in an assumably higher position in terms of representing an academic world, while my relatively young age and also gender can hinder my 'authority' and thereby affect individuals' participation. Reflectivity can also be seen as being reflective towards power relations that structure interpersonal relationships (Cloke et al., 2004, p. 181). Power relations influence and frame knowledge production, when different actors' knowledge over certain phenomena gets treated differently constructing the situated nature of knowledge (Cloke et al., 2004; Taylor, 2015).

In addition to a methodological framing, a researcher can define a standpoint theory for his or her research, if necessary. Standpoint theory can be explained as a complementing theory that describes a researcher's value perspectives towards the research topic. In my research, that would be a feminist theory because of the focus is on power structures and gender. Feminist theory can ideally guide a researcher to understand how power is embedded in every step of the research through a researcher's own position. For feminist geographers, dichotomous categories, intersectionality and problematic power relations have always been in the centre of research (Rose, 1993; Cloke et al., 2004; Valentine, 2007). Power structures can be seen in case-study oriented research, where researcher aims at yielding sensitive knowledge from the participants. Cloke et al. raise the question of how one can defend this kind of research where a participant might possibly even be upset by the results (2004: 192). For development geographers, the answer would be to ensure that gained information will be returned to participants and be used for improving their lives. Another essential aspect of the power structures is a question of knowledge and who has a voice to bring it forward. Human geographers, especially among development geography field, often aim at 'giving voice' to others (Cloke et al., 2004). This should be criticized as it entails the notion of power and assumption that these people do not have voice without outsider's presence. In order to avoid this underestimating setting, one should be more specific and define to what arena we want to bring these voices. In my research, a feminist standpoint theory means an awareness of stereotypical gender dynamics, which should help me not to reinforce existing structures in this research.

Cloke et al. present ethnographic research as one of the central lines of research in the human geography. As they argue, "*culture is often used to explain conditions and events*" (2004: 183). Culturalism argues that human behaviour is dictated by culture and ethnographic research can explain culture and its relationship to humans. I chose not to perform ethnographic research, as I believe that culture should be understood as one of the cross-cutting contexts of a research and that it should be studied through individuals' experiences of the world. More importantly, focus on the culture can divide the world to 'them' and 'us' as the reference point can easily, albeit unconsciously, come from

a researcher's own culture, which can then strengthen the process of 'othering'. However, as a context, culture should always be present in any research as it can help to display social constructions and power within these structures.

5.2 Research material

This research entails both secondary data and primary data. Secondary data consists of theoretical background and public documents regarding climate change and agriculture. Theoretical background of the research forms the basis and justification of the research and it has already been presented in the previous chapters. In addition to this, examination of the interview results will entail supporting policy documents, which is part of the secondary data of this research. Primary data consists of interviews and forms the empirical part of this research. Interviews were conducted in February 2018 in the Taita Hills. Conducted interviews consists of 28 household interviews (17 female participants and 11 male participants) and seven key informant interviews (four female participants and three male participants). Household interviews consist of 12 two-headed households (THHs) out of which both female and male farmers were interviewed (23 interviews in total) and five interviews with female farmers from single-headed households (SHHs). One male farmer could not be reached for the THH interviews, which explains the uneven number of sampling. Because of the different socio-economic conditions of the SHHs, the analysis will be separate for them. According to the initial research plan, the idea was to focus on the THH interviews for the purpose of analysing intra-household level differences. However, due to unpredictable interview situations, some interviews were conducted also with the SHHs as it would have not been possible to deny individuals from participating. After fruitful interviews with the SHHs' female farmers, I decided to include the interviews into the sample to have a deeper understanding of this research topic and to include their voices as well.

The main requirement for the household interview participants was that together with their spouse, they were considered to be the heads of a household in a family, and in position of making decisions concerning agriculture practices. In addition to this, farming had to be the main source of employment at least for one of the spouses. Sampling and interview methods will be presented in the following chapters. Length of the interviews varied between 20 to 60 minutes. Each household interview was transcribed, which resulted in 122 pages of data. Key informant interviews lasted approximately 30 minutes. For the key informant interviews, the main requirement was that they had to be employed

in the agriculture sector from the expert point of view, e.g. the participants worked either for the county, a non-governmental organization (NGO) or where involved in agriculture-related research.

5.3 Semi-structured theme interview as a research method

It is argued that qualitative research is fundamentally case-study oriented, which takes a focus on single or multiple instances of a certain phenomenon and emphasises the interrelatedness and importance of context (Bazeley, 2013). Following this, it can be argued that this research is also a case-study oriented as it aims to gain information on a certain phenomenon through individuals' experiences. Interviewing as a method for this topic is well argued because of its strong theoretical backing within vulnerability research. Household surveys and in-depth or semi-structured interviews are commonly used methods in a contextual vulnerability analysis (O'Brien et al., 2007; Singh et al., 2016; Ngigi et al., 2017) . It also works in line with the post-structuralist methodological stand, where the aim is to gain insights of the topic in order to critically examine existing discourses and structures that they create. From epistemological perspective it can be argued that interviewees are seen as active and equal participants who are experts of their own experiences. It should be acknowledged that each individual has their own ambitions and they will aim at forming a coherent story that supports their own goals and perception of a self (Cloke et al., 2004; Hirsjärvi & Hurme, 2000; Wodak & Meyer, 2016). Cloke et al. argue that the notions of contextuality and intersubjectivity are the core strength of this methods, because they allow deeper understanding on many commonly studied aspects of human geography if used properly (2004).

I chose to use semi-structured interviews as research method because it would allow me to get comparable data from all the participants while keeping it open for additional information. Semi-structured interviews can also be easier to conduct, if the interviewer does not have much of an earlier experience, as I did not have. Interview questions were formed on the basis of theoretical concept and similar kinds of research (Alkire et al., 2013; Bikketi et al., 2016; Singh et al., 2016; Anderson et al., 2017; Ngigi et al., 2017; Wangui & Smucker, 2017). Additionally, some of the key areas of the interview structure were based on Climate Risk Profile of Taita Taveta (Government of Kenya, 2016). The household interview's structure was tested with the research assistant and interpreters, who all were local and familiar with the farming conditions. After that, the language and the order of the questions were refined in order to have a coherent set of questions. After the first couples of interviews, I modified the structure of the interview once again as I found some questions were too

repetitive or that the topics were covered more naturally in other sections. The final versions of the interviews are presented at the end of this work (Annex 1 and 2).

Ethical protocols i.e. research ethics that should be taken into consideration when conducting interviews are guaranteeing participants' anonymity and full consent on the participation to the research (Cloke et al., 2004). In this research, participants were informed about the nature of the research, its topic and its complete anonymity in the analysis of the responses. Every participant had the opportunity to decline the usage of a tape recorder during the interview and they were informed about how many persons would be interviewed and how their responses would be analysed. Participants were also offered a possibility to end the interviewing whenever they wanted, or to skip questions that they did not want to answer. It is important to inform participants of these aspects for ensuring more equal stand between interviewer and interviewee (Cloke et al., 2004; Hirsjärvi & Hurme, 2000). Participants were also told that they would have access to the final paper, as it would be placed to the library of Taita Research Station of the University of Helsinki in Wundanyi. However, it should be noted that the accessibility of the paper can be low for some of the participants, who were living in other towns. After every interview, the participants had the chance to ask more about the research and its topic. At this point, some of the participants asked how the research would benefit them and whether I was going to start a project with some of the interviewed farmers. This can be seen reflecting unequal power relations where I was seen to represent an opportunity to improve their lives. It could also be argued that some of the farmers participated in the research because they thought they would gain some personal benefit even though nothing like that was promised in the initial presentation of the research. Farmers contact details were collected only for the purpose of conducting the second round of interviews with the households. Interviewees were conducted according to the agreed timetables.

In order to have full reflection of the reliability and validity of the collected data and applied methods, it is important to consider what were the possible shortcomings and difficulties in conducting the research. In this research, shortcomings of the interview method can be divided in two groups, were the first one is to do with the participants and the second one with the topic itself. When it comes to participants, the most relevant factor is the question of language. In my research, it was essential to work with an interpreter as I do not speak Kiswahili well enough and some of my participants did not speak English. Usage of an interpreter means that the message does not come directly from the participants but rather it has already been analysed once. Despite how good work the interpreter is

doing, there are always some decisions and changes of words that might not come over to an interviewer. This could be overcome by having a second opinion about the translation, but this is hardly possible due to lack of resources in a Master's thesis work. For this reason, I cannot concentrate on specific wordings in my analysis because I cannot be sure whether it is the original choice of words or an interpreter's translation. Another language related difficulty with some participants was their eagerness to perform the interview in English despite of their apparent lack of language skills. If the participant did not take a polite hint to change to Kiswahili or Kitaita, I had no other choice than to do the interview in poor English even though I would know that their answers would not be as deep as they would be if performed in their stronger language. I felt that it would have been impossible to say to a participant that his or her English was not good enough and that they should use the help of an interpreter. This kind of comments would have destroyed the delicate atmosphere of the interview and hinder the possibility of having a good conversation.

Another central shortcoming of my method comes from its aim to cover sensitive topics in relatively short interview period. Interview questions covered topics such as decision-making power within a household, which can be a sensitive question for some participants. During quite short interview time, it was hard to make an atmosphere where participant would feel comfortable enough for admitting that s/he does not feel that s/he can participate to decision-making or would want to participate more. Of course, I cannot assume that people would be lying about their possibilities to participate but in some instances, it became apparent because of some conflicting answers within interviews. Conflicts can also be analysed by comparing answers within a household. However, decision-making power is a good example of possible hospitality bias within my data, whereby it can be supposed that some of the participants preferred to answer in socially desirable way rather than describing the whole reality. Additionally, it is important to understand how the sampling method effects on the quality of the data. It can be argued that by using a random sampling for finding the participants for the interviews, it can be a challenge to find participants with targeted socio-economic background. For this purpose, a researcher might choose to use a purposive sampling instead (for instance, Wangui & Smucker, 2017). In order to gain a presentation of varying social stratification within a society, this kind of research is often conducted first by doing a wider household survey, which is followed by ain-depth interviews with representatives of certain socio-economic and demographic backgrounds.

5.3.1 Household interviews

Household interviews were conducted in two rounds; the first round was for female farmers with a female interpreter, and the second round for male farmers with a male interpreter. The reason behind conducting two separate interviews for the both members of a household was to include both female and male views of the subject to this research. Household interviews or surveys can consist only of the male participants' comments, which can skew the data if it is assumed that gender is a relevant factor. When both members of a household are included in the interview, the validity of the data is improved while also allowing a comparison between answers on intra-household level. Interviewing order was designed with an assumption that male participants, e.g. husbands can more likely try to affect female participants, e.g. wives' answers.

Geographical context of my research area consists of four small towns within a same agro-ecological zone (represented in the chapter four 'Research context'). As a recap from the research context, the most prominent agriculture-related factors are soil, land use, aspect and slope, elevation (up to 1407 m.a.s.l.), annual average temperature (20.83˚C); and precipitation (1390mm) (Boitt et al., 2014). Villages were chosen by their farming conditions but also by their accessibility. The research area consists of Wundanyi, Weruga, Mgange and Ngerenyi (Fig. 5). Households were chosen from the same agro-ecological zone for the purpose of analysing the responses as one entity, rather than trying to cover the challenges of different agro-ecological zone. Even though this would have enriched the analysis, I decided it is not possible in the scope of this work. Households were chosen by a semi-random sampling within a walking distance from the main roads. Interviews were scattered in four villages for the purpose of preventing participants engaging with each other. Four households were chosen from each town first by random sampling and then targeting some specific households that would increase variety within socio-economic background factors. Geographic context will not be analysed on town level but as one entity because of the low number of participants from each town. Households were marked by using a GPS in order to connect male participants' responds with correct female participants' responds. Location information was only used for the purpose of connecting correct female and male participants and not for creating any cartographic presentations, as it would have compromised the anonymity of the interviews. Interview questions were divided into five main sections, which were background information, activity profile, social networks, vulnerability to climate change and decision-making processes (Annex 1). In spite of the clear structure, questions were often altered along the interviewing if the topics were covered in some other section. Interviews were individual, but an interpreter was present almost every time due to language barriers.

5.3.2 Key informant interviews

Participants for the key informant interviews were selected from each village (Fig. 5) according to relevance of their background and possibility to participate in a short time period. In total, there were seven key informant interviews out of which three were men and four were women. Key informants represent mostly the county-level actors as most of the informants were agriculture extension officers. In addition to the extension officers, some of the participant represent stakeholders of agriculture-related research and one farmers' NGO. Due to limitations of time and resources, the main focus when collecting the data was on household interviews which resulted in a notable smaller sampling size for the key informant interviews. For the analysis, the interviews will work as supplementary data for deeper reflection of contextual vulnerability of farmers.

Following the small sampling size, it is of high importance to maintain the anonymity of the participants. Therefore the analysis will not entail any background information of the participants, even though it would work as context for their point of views. The focus will rather be on the content of their responses without further analysis on their employment status or socio-economic factors. The key informant interviews were semi-structured interviews with a purposive sampling method. Interviews were done in English and without an interpreter. The discussed topics were vulnerability to climate change, female and male farmers' responsibilities, adaptation programmes, agriculture-related challenges, and co-operation between different stakeholders (Annex 2). Discussed themes are based on the theoretical background and were structured so that the responses would be completing the household interviews.

5.4 Analysis of the primary data

There are many different ways of coding of data, which vary from *in vivo* coding, where the codes are direct quotations from the text, towards more theoretical based coding, where codes are formed a priori on basis of the literature (Bazeley, 2013, p. 166). *Etic* codes do not appear in the text themselves, but they rather represent certain range of phenomena that a researcher expects to find from the data (ibid.). Importantly, despite having formed a priori codes on the basis of the literature, there should always be space for creating more codes along the work. Most of my codes were theory-based etic codes but there very many nuances that raised from the interviews adding more variety to coding than could have been predicted beforehand. In a way, it can be argued that a theory-based coding represents a deductive analysis method while codes that were formed purely on the bases of the data represent an inductive analysis method.

Coding of the data is an iterative process which eventually ends when a saturation point with certain codes is reached. The next step in the analysis of the data was to start sorting existing codes to see which ones occurred only few times (disregarded as not relevant) and which ones were more dominating (kept for further analysis). After this, codes were connected into categories (code families, see Fig. 6) and subcategories for more detailed analyses. I used computer software Atlas.ti for coding of the interviews. Atlas.ti software is a practical tool for the construction of higher level codes, i.e. thematic concepts and categories. For example, decision-making concept is a conflation of codes such as ‘alone’, ‘consult each other’, ‘difficulties’, ‘with husband’, ‘with wife’, ‘consult family’ and so on (Fig. 6). Descriptive coding and construction of meta-codes formed a basis for furthering the analysis to comparative and relational gender analysis where codes were combined in new ways. The key interest was to describe regularities and co-occurrence of certain codes to see how they were interlinked. There are many ways for combining codes, but general means are to study regularity of co-occurrence of certain codes and what impacts they have on each other. For me, this part of the process meant combining meta-codes for the purpose of detecting patterns between responses. I used MS Excel for analysing answers so that both interviews from the THHs were tabled in a comparable way. Tabling of the answers also allowed me to see if I had captured answers from all the participants. If some parts of the table were left empty, I returned to the interviews to see whether there was something left unnoticed or if there was something explaining the lack of a certain element.

Fig. 6 presents a code tree where single codes from household interviews are combined to code families, meta-codes, categories and finally to concepts related to the research question. It

demonstrates how singular or even irrelevant codes can conflate wider meanings as meta-codes. Presenting codes this way also demonstrates how the simple outcomes can hide diverse and detailed answers that are combined in purpose of having wider entities for analysis of results. This is only a capture of all the codes and therefore entails a level of generalisation with respect to number of codes and connections between meta-codes and categories. Furthermore, it should be noted that each categorization was performed separately for male and female farmers in order to reveal possible gendered differences.

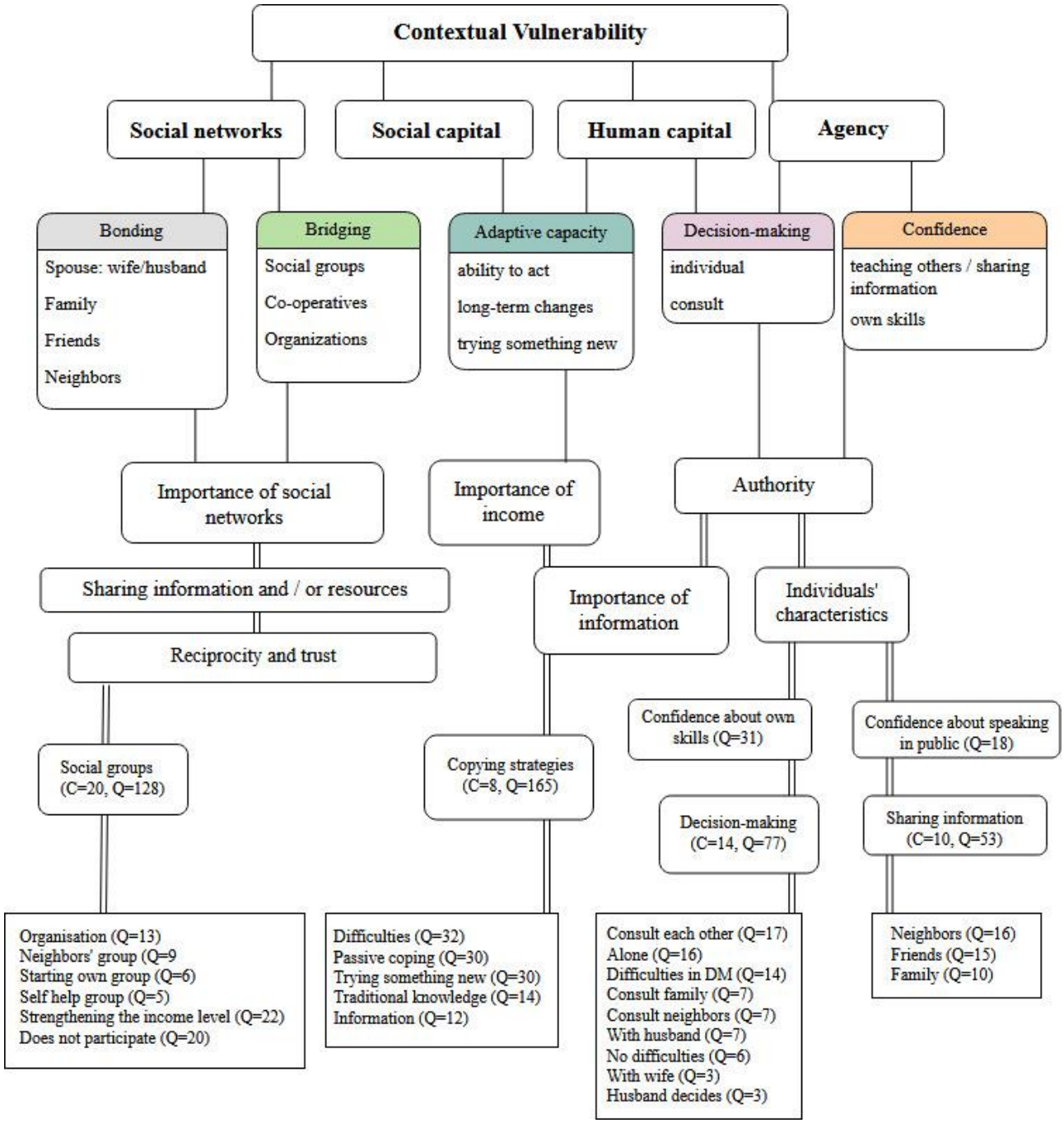


Figure 6. Representation of different layers of the coding process. (C=code, Q= quotation) *Source*: Author

5.5 Critical discourse analysis as an approach for gender analysis

Language as a discourse is used for giving legitimacy to certain viewpoints and to cement a particular type of understanding and knowledge of the world (Wagenaar, 2011; Bazeley, 2013). Comparison of the data and the discourses that it constructs with a wider political context can work as a base for conducting critical discourse analysis (ibid.). Discourses are studied in a certain context, which gives validity and meaning for the words. Context in this research means that even though the results might not be representative, it can create new understanding and support already existing criticisms of the prevailing vulnerability discourse. The concept of context reflects how discourses are socially constitutive and thus embed power relations. Critical discourse analysis methods aim at dismantling ideologies and power through systematic investigation of discourses (Wagenaar, 2011, p. 158; Wodak & Meyer, 2016). Discourses, such as vulnerability concept, do not only reflect practices of decision-making and opinion building but also express social relations, interests and power (Cannon & Müller-Mahn, 2010; Taylor, 2015). As Cannon and Müller-Mahn argue, analysis of development discourses can help us to understand why climate change issues are handled the way they are (2010, p. 631).

In order to have a full reflection of the gendered differences, the critical discourse analysis takes a stand-point of gender analysis. Due to similar interest points of gender analysis and critical discourses analysis, they can be seen as a complementing analysis method. In this research, gender analysis can be understood to determine the research structure, questions and construction of data. In concrete terms, it means reflectivity towards one's own position and subjectivity, which were already represented in the previous chapters. On data interpretation level, gender analysis allows one to examine whether there exist gendered power structures. However, it should be noted that even though the purpose of the research would be to question the power structures, the very nature of the woman versus man dichotomy is highly questioned and noted problematic in feminist geography (Rose, 1993). It is worth asking whether this research dismantles or in fact constructs the very same structures that it criticises. In the same sense it can be argued whether the heteronormative construction of a household offers a full representation of the reality. Despite being problematic, this research structure represents a common way of performing vulnerability analysis and therefore produces comparable results in respect to general discourse. It can also be argued that in this research context, this kind of representation of a household represents an average setting and it is therefore a justified research unit, although it would not be the whole truth. Additionally, the inclusion of the single-headed households breaks constructed dichotomy by representing marginalized experiences.

The applied process of critical discourse analysis is illustrated in Fig. 7. Modified from Wodak and Meyer's presentation (2016, p. 14), the circular process describes how the primary data is constructed and analysed, compared with secondary data and finally brought back to the theory-level. Theory is seen to be guiding formulation of a research questions, data selection and collection, analysis of data and interpretation. In this research, the secondary data presents the climate change discourses and are therefore an essential step towards full reflections of the results. Critical discourse analysis along with gender analysis allows contrasting individuals' experiences i.e. empirical data with policy level discourses and theoretical background, i.e. secondary data.

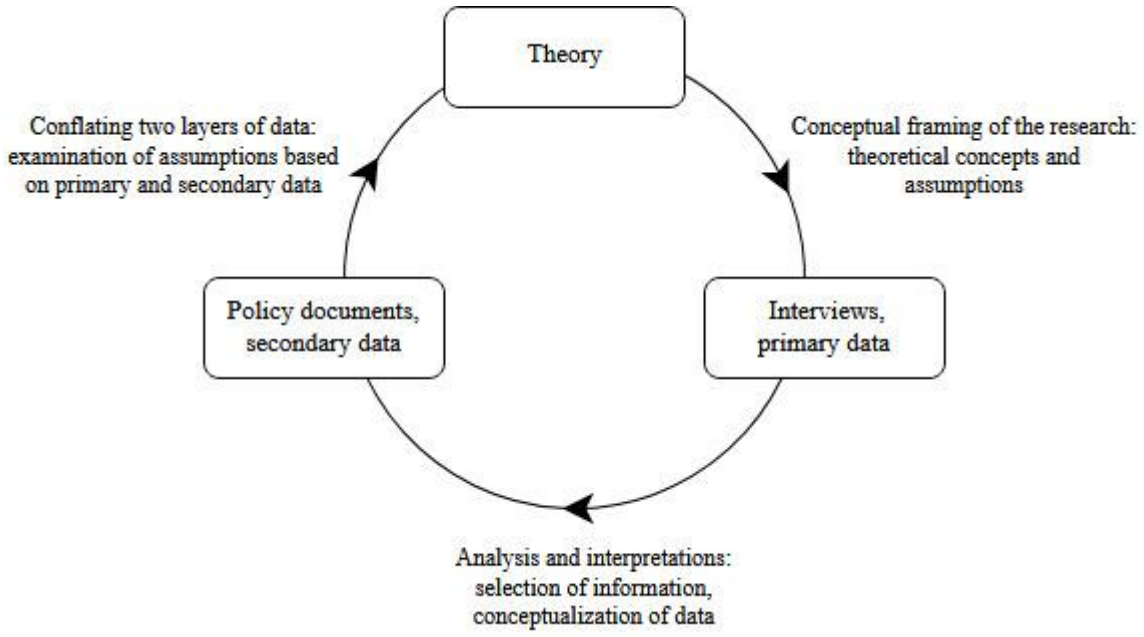


Figure 7 Critical discourse analysis as a circular process. (Modified from Wodak and Meyer 2016, p. 14)

6. Results

Examination order for the results chapter follows the structure of the contextual framing of this research. In order to prepare the ground for a construction of contextual vulnerability analysis, it is crucial to start the analysis with a brief examination of the central socio-economic factors of the participants. Following to that, the analysis continues with the description of individuals' social capital and social networks. Through the analysis of society's characteristics, the focus turns into seeing what meaning they bring for individuals followed by analysis of elements of human capital and agency. Both aspects become more accurate through the examination of intra-household differences regarding the decision-making process and working responsibilities. After constructing the central elements of contextual vulnerability, the analysis is completed with a comparison of farmers' response strategies with outcomes of contextual vulnerability analysis. In order to place the empirical part of this research back to theoretical context, results of household interviews are accompanied with the analysis of key informant interviews and discourse analysis of climate change and agriculture strategies.

The results are examined separately for the single-headed households (SHHs) and two-headed households (THHs) due to their differing social context and focus on intra-household differences. It should be noted that the term 'two-headed households' is not commonly used as the general tendency is to define whether the examined household is either female- or male-headed. This research does not aim to analyse differences between male- and female-headed households, which explains the gender-neutral expression. In accord with this, the analysis does not determine which one of the spouses is considered to be the head of the household. It can be questioned whether this structure dismisses the existing power structures.

Some of the chapters on the results will include tables for visualisation of the data. The source of all the tables is the author of this work unless mentioned otherwise. Farmers' reference number (for instance, f1 or f2) have been randomly organized so the numbers do not indicate gender or location of the interviews by any means. In tables 4, 5 and 10, the prevalence of farmers' similar responses is calculated. It should be noted that each farmer may have answered more than one of the presented aspects, which means that the numbers are not always even with the total sampling of female and male farmers (N=12 for females, N=11 for males). Prevalence of each aspect should be compared individually in respect to total sampling number. Despite not being representative, the thematic

categorisation of the data will allow the reader to gain a better understanding of the research topic and later on reflect its truth worthiness with respect to the theoretic background of the research.

6.1 Participant profile of the household interviews

In the THHs, women's age distribution was evenly distributed between 20–68 years, where the youngest participant was 25 years old and the oldest 68 (Table 2). For the male farmers, the age distribution varied between 30 to 80 years, where the youngest participant was 31 years old and the oldest was 80 years old. Table 2 shows clearly, how the female farmers tend to be younger than male farmers, according to this sampling. For the SHHs, the participants were notably older, as four of the participants were 60–80 years old and only one participant was 31–40 years old. Another central element of background information is the level of education, which also varied slightly between genders. THHs' female farmers had evenly completed primary and secondary level education, whereas most of the male farmers had completed secondary education and only few had remained on primary level (Table 3). SHHs' female farmers' education level was lower, as three of the participants had less than primary level education and remaining two had primary level education. This indicates low possibility to have access to education.

Almost all of the farmers reported farming or other on-farm activities as their main source of income except for a few male farmers, who were also employed off-farm or received pension. Male farmers were either working as casual labourers or they were working either in construction or masonry. Land size varied between 0.2 to 4 hectares, while average size was 1 ha. However, the size of the land should not be taken as an accurate description as many of the households reported sharing the land with their parents or sibling which decreases the actual size of the land per person. This aspect was not asked in first half of the interviews, which explains why it is not included here in more detailed description. Usual cultivated crops were maize, tomatoes, cabbages, Irish potatoes, and bananas. Most of the farmers were living with their families, which consist of themselves and their children i.e. so called 'core family'. Some of the farmers were living with their extended family, which can include their parents or adult siblings and their children. When talking about the family, farmers quite often referred not only to their partner but also other relatives living in the same household or using the same land.

Table 2. Age division between female and male participants in the THHs. (Female N=12, Male N=11)

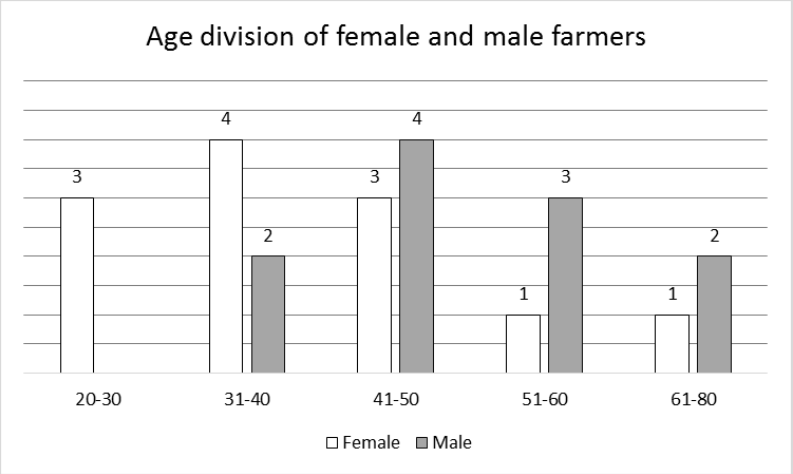
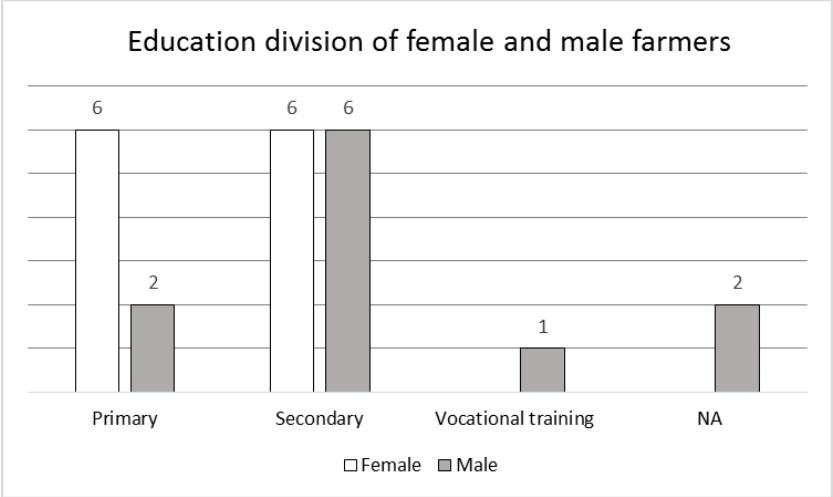


Table 3. Education division between female and male farmers in the THHs. (Female: N=12, Male: N=11).



6.2 Contextual vulnerability

6.2.1 Social capital and social networks

The elements of social capital are information sharing (with whom), reciprocity and exchange (material or immaterial) and trust (Table 4). These elements are divided into positive characteristics (favorable for an individual) and negative characteristics (perceived adverse for an individual). Most of the two-headed households' female farmers pointed friends as their primary group for sharing information, second important was neighbours and family. Aspects of reciprocity and exchange had commonly something to do with helping one another and sharing good experiences. Most of the participants valued social groups and considered them worth participating in. Male farmers reported family as the primary group for sharing information, which was followed by neighbours. Remaining social groups have an even distribution of answers. Aspects of reciprocity were mainly reflecting the perceived importance of sharing the problems and working effectively as a bigger group rather than as separate individuals. Like with the female farmers, also male farmers valued groups strongly and found them important. Negative charasteristics of social capital were fewer than positive. Female farmers (three participants) reported not sharing information or hardly sharing information. Social groups were found important but the possibility to participate was limited for some individuals because of the registration fees. One female farmer had had negative experiences regarding trust because her group's funds had been misused. For male farmers, none of the participants said that they would not share information with someone. However, also they had experienced the exclusive nature of the social groups because of the registration fees. One male farmer argued that most of the people do not actually participate in society. Same as for female farmers, also some of the male farmers had experienced misuse of the group's funds and also one person thought that it is better to keep the possible challenge to yourself because outsiders would start rumours about one's troubles.

Table 4. Social capital and society's characteristics, positive and negative dimensions (THH).

Positive characteristics			Negative characteristics			
Information sharing	*Reciprocity, exchange*	*Trust*	*Information sharing*	*Reciprocity, exchange*	*Trust*	
friends (3), friends and neighbours (2), neighbours and family (2), family and friends (1)	sharing good experiences of farming (2), community volunteer (1), strong reciprocity within groups (1), inclusive: women's self-help group for disadvantaged (1)	strong willingness to participate to groups, groups are considered good opportunity	does not share (2), seldom (1)	groups are exclusive because of the registration fee (4)	misuse of funds in a group (1)	**female farmers** N=12
family (4), neighbours (3), wife and friends (2), friends (2), within groups (2)	discussing the problems with neighbours (3), starting a new group together, sharing (2), strong within a group (1)	strong willingness to participate to groups, groups are considered good opportunity	No responses	groups are exclusive (2), most people do not want to participate to society (1)	misuse of funds in a group (2), people make rumours about other people problems (1)	**male farmers** N=11

Participation to social groups and their meaning for individuals is further examined in Table 5. Importance of the social groups represents a wider meaning and value of participation whereas reason for participation is the concrete impact that social groups can bring to an individual's life. Participation in social groups creates networks between individuals, which are divided into bridging and bonding networks according to homogenous and heterogeneous nature of groups. Negative characteristics of social groups are reasons for not participating to groups. Female farmers' most important reason for participating in social groups was having access to loans and secondly, having access to information. Importance and value of the social groups meant an opportunity to strengthen one's income level, participate in trainings and to help one another. Female farmers' social networks were more commonly bonding networks, which mean that they preferred women only groups (homogenous) or groups with people who were considered close, such as friends or neighbours. For male farmers, the most important reason for taking part in social groups was to have access to markets, which was followed by access to information and loans (Table 5). They valued the possibility to strengthen the income level just as the female farmers. They also considered important to work as a group, because it would bring more power for individuals. Male farmers' social networks were more commonly bridging (heterogeneous) than bonding, although the difference was small. Reasons for not participating to social groups varied slightly between female and male farmers. Female farmers

raised the challenge of paying the registration fee, difficulties of having enough time to participate, and feeling that there was nothing new to learn from the social groups. Male farmers who had chosen not to participate to social groups had previous had bad experiences or they did not have enough time. Interestingly, most of the male farmers who reported not participating in social groups also said that they were planning to participate albeit they had not done it yet. They regarded social groups as an open possibility whereas female farmers who had troubles joining because of the registration did not bring up the idea of joining later.

Table 5. Participation to social groups and individuals' social networks. Elements are divided into positive (colour green) and negative characteristics (colour yellow).

Reasons for participating	*Importance*	*Bridging*	*Bonding*	*Reasons for not participating*	
loans (7), information (3), better access to markets (1), volunteering (1)	strengthening the income level (4), helping each other (2), trainings (2), children's education (1)	4	5	cannot pay the registration fee (2), already has the information, might join again (1), does not have time to participate, husband does (1), better to work alone (1)	**female farmers** N=12
better access to markets 4), information (2), loans (2), water project and goats (1)	strengthening the income level (4), stronger as a group (2), helping each other (1), security (1),	4	3	intending to join (2), previous bad experiences (misuse of funds in a group) (1), does not have time (1)	**male farmers** N=11

Table 6. Illustrative farmer quotes of the positive experiences of social groups (THH)

Male farmer (f10): "I decided to join these groups because we had an idea of coming together, and when we come together, we can make a bigger change. We can empower our village. The one who, sometimes, decided to collect friends and we started together, we share together. That is how we started our group."
Female farmer (f9): "There is a great importance because of the synergy and also you get more information, like advices from your friends."

For the single-headed households (SHHs), the participation to social groups and having access to social networks varied from the experiences of two-headed households. Only one of the participants reported participating to a social group. She was one of the founding members of the women's self-help groups. The group was created in purpose of having access to loans and financial stability. However, she reported that the group has not been as successful as could have been because of all the members have not paid their contributions. In comparison to other SHHs individuals, she was the only one to have access to this kind of group. All of the participants considered social groups useful and worth participation, but they were inaccessible either due to unaffordable registration fees or inaccessibility created by a high distance (Table 7). Attitude towards neighbours or towards sharing information and experiences with other farmers varied greatly. One of the participants described a strong reciprocal and trusting relationship with neighbours and friends, which became concrete in sharing resources and experiences with them. In contrary to this, one of the participants argued that it is not wise to share information with neighbours or ask for help. However, all of the participants reported sharing information with family or relatives. Following this, it can be argued that the social networks of the SHHs were mainly bonding networks due to their homogenous nature (women only or close people). For the SHHs, elements of social capital and social networks were secondary when compared to elements of human capital. When compared to the farmers from the THHs, it can also be assumed that the social networks in terms of core and extended family are not as wide as with the THHs have.

Table 7. Illustrative farmer quotes of the negative experiences related to social groups (SHH)

Female farmer (f26): "In order to participate, you need to have some money. You cannot be in the group with empty buckets. In the group, there is always contributions that you have to pay. But according to me, I have nothing."
Female farmer (f25): "I cannot afford the registration fees and also there are some groups that usually just take your money. You are saving money in the group and they take it and won't give it back to you."
Female farmer (f28): "I am in the women's self-help group but it is not very successful because people who have been given loans are not re-paying them back so it is hard for each member to continue in the group."

6.2.2 Human capital and agency

Elements of human capital are individual's skills, knowledge, ability to act, confidence in own skills and speaking in public, e.g. individual's personal characteristics. Evaluation is done from the perspective of what sort of qualities inforce individual's possibility to adapt rather than evaluating individual's intelligence or competence *per se*, which would not be meaningful or possible. Based on the theoretical framing of this research, it is argued that characteristics which would strengthen adaptation are prior experience of agriculture, confidence in own skills and speaking in public in terms of sharing information and giving advice on agriculture, access to information and role in the family in terms of working duties and individuals' own remarks on her or his role. After reflecting on the elements of human capital, the analysis is deepened with the question of agency. Agency is constructed on the individual's working duties and value of his or her work, and on the possibility to participate in decision-making process concerning resources and agriculture practices. Elements of agency are constructed on human capital and social capital. Agency is considered as an ability to act according to one's own values and goals.

For the THHs, female and male farmers were divided into two categories, where the first one represents elements that illustrate strong human capital and the second one represents elements that hamper strong human capital from being actualised (Table 8). Categories were created on the basis of the two-headed household interviews so that the analysed elements were same for both female and male farmers but they responses were analysed individually. Farmers who are part of the first category fulfil all of the mentioned aspects according to their own experiences. Farmers who do not belong to the first category have some of the negative elements that can weaken individual's possibility to achieve all the benefits of strong human capital and agency. Most of the female farmers reported all the elements of the first category (N=7), while remaining participants either did not have access to information, or participated to the decision-making or not had much knowledge of the agriculture in general. For the male farmers, all of the participants reported all the elements of the first category (N=11).

Table 8. Elements of stronger and weaker human capital and agency based on theory and interviews.

Elements illustrating strong human capital and agency	*Elements hampering strong human capital and agency*
individual's authority: a role model for others	individual's authority: little or non
confidence in own skills: teaching others and thinking that people listen to her or his advice	confidence in own skills: does not share information or believe that people follow the advice
knowledge: information or traditional knowledge	knowledge: does not know much about agriculture; new in agriculture
ability to act: in case challenges or for the purpose of achieving a goal	ability to act: passive, follows other people' advice
participation to decision-making: resources, income and agriculture practices	participation to decision-making: partner decides or cannot decide without hearing her or his opinion, passive

Central elements of human capital for the SHHs were individuals' skills and knowledge about agriculture that allowed them to act in spite of the challenges and disadvantaged position. All of the SHH farmers emphasised their traditional, in prior knowledge about agriculture. This came apparent in their examples of how they cope with the challenges brought by the climate change. All of the participants were also able to recognize the changes in the climate. In spite of the high knowledge of the farming practices, only one of the participants reported sharing information with her neighbours and friends, which is in line with the above mentioned narrow social networks. Access to information was quite varying for the SHHs. Two of the participants reported good access because of the regular meetings organized by the extension officers and because they visited her farm on regular bases. The remaining participants reported little if no-access due to little information that is available in extension officers' meetings or because they lacked the possibility to join social groups. Distance to the meetings was also affecting to individuals' possibilities to participate trainings, which is also in line with the reasons for not participating in social groups. Agency in terms of work and value of it was strong for every participant since they had the main responsible for maintaining the food production and food security of their own and possibly of their children. All of the participants reported making their own decisions. In difficulties, one seeked advice from the extension officers, and one reported asking advice from the neighbours. Challenges with decision-making came from the changing and unpredictable rain patterns. Some reported that they have been doing farming in a same manner for many years so there are not many decisions to make.

6.2.3 Household-level differences

Two-headed household (THH) interviews were conducted so that both female and male farmers answered to the same questions. Additionally, spouses were asked to describe their partner's working duties. In order to deepen the analysis of decision-making process and gender roles, the following analysis will concentrate on differences within THHs. Single-headed households are not included in this part of the analysis. Decision-making process is examined in terms of decision-making concerning resources, income and farmers' response strategies. Gender roles are analysed through working duties and how they were described by the farmers' themselves.

Table 9 presents how farmers described the decision-making process within their household. According to this table, it can be argued that the farmers' experiences of decision-making are inconsistent between spouses. For this part of the results, the main interest comes from these conflicting answers and reasons behind the differences. I am not intending to emphasise a certain process as a preferable one, but rather try to see how individuals experience their possibility to participate in decision-making. For this purpose, answers are divided into four thematic categories. The first category (N=3) represents households, where both female and male participant responded deciding together with their spouse when it comes to use of resources or response strategies. The second category (N=4) includes households, where female farmer reported deciding alone or according to her working duties whereas male farmer responded deciding together with his spouse. The third group (N=3) was the opposite to the previous group, as it presents male farmers who reported deciding alone while female farmers argued deciding together or asking their husband's opinion. The last two groups (N=2 in total) entail households, were only one of the farmers responded to the question, which resulted missing data. All of the female and male farmers who reported deciding alone had elements of high human capital. For both genders, their age was not a defining aspect since it varied greatly for all the participants. For male farmers, all of them enjoyed good access to information and resources whereas half of the female farmers enjoyed good access and remaining two reported having access to information but lacking possibility to implement the ideas. Female farmers who reported deciding alone said that they decide alone about their own tasks or that they are responsible for farming. Male farmers were mostly concerned about the cattle but implied that their good access to information allows them make decisions. None of the male farmers respondent asking support from their wife in challenges while most of the female farmers reported asking support or opinion of their husband if faced with sudden difficulties.

Table 9. Decision-making concerning use of resources and responses strategies. Each line form a household unit which responses were similar to each other. Number of households in a category is marked with N.

female farmers' responses	*male farmers' responses*	number of households
consults each other	consults each other	N=3
decides alone according to the working duties	consults each other	N=4
decides together, seeks consult from her husband	decides alone when has the information	N=3
NA	sometimes decides together, sometimes tries to find help	N=1
consults each other and sometimes makes decisions alone	NA	N=1

All of the participants were asked to describe her or his normal workday during the on-going season (end of dry season). Following to this, participants were asked to describe their partner's workday. Common duties for female farmers were 1) farm work: planting, weeding, watering, digging, carrying manure, different kinds of heavy and light work, 2) household work: preparing children for school, making food (three times per day), and other household work, 3) looking after the cattle: feeding, milking, giving animals water to drink, and 4) supervising hired labourers. All the female farmers spend most of the day time working in the farm and doing household work. Most of the female farmers did not have any other income creating activities except the little that they could get from selling of their products. During the time of interviews, most of the farmers were waiting for the rainy season to begin so that they could start planting. Except for few individuals, most of the female farmers were farming together with their spouses or alone. Male farmers described female farmers' working duties mostly by saying that "we share the responsibilities" or that "she assists me". Male farmers argued that their spouses are mostly concerned with preparing the land and sometimes planting, but mostly they are concerned about the household work. In general, male farmers' description of the female farmers' duties were narrower than their own description. None of the male farmers mentioned responsibilities related to cattle, even though half of the female participants reported looking after the cattle as one of their working duties.

Common duties for all male farmers were 1) looking after the cattle: feeding, giving animals water to drink, milking, 2) farm work: digging, planting, watering the plants, planting, and 3) labour work outside the farm: masonry, carpentry and other casual labour. Female farmers described the male farmers' working duties as mainly either casual labour or looking after the cattle. Some of the female farmers described their husband's workday as "he helps me in the farm". For male farmers, the

general situation was that they were looking after the cattle in the morning, doing some casual labour and then take part to farm work if possible. When compared with the female farmers, male farmers were more unlikely focusing only on farming but rather having other activities. Regardless of their focus on other working duties, male farmers were always strongly participating to the decision-making regarding agriculture.

6.3 Farmers' response strategies against environmental and climate-related changes

Farmers' actions in the face of climate change are divided into four categories: positive adaptation, coping strategy, passive coping and maladaptation (Table 10). Positive adaptation refers to longer term changes that are more proactive, might brought changes more gradually and are chosen so that an individual understands the reason and value of these actions. Coping strategies refer to quicker actions that might bring change or alleviation to situation only for shorter period. An individual who is performing coping strategies acts when the shock is taking place. Passive coping means that an individual is not actively doing anything to alter the situation but is rather waiting for it to pass. Even though coping refers to some action, in this context it refers to coping with the environmental and climate-related changes, therefore the term passive coping and not for instance passive observation. Maladaptation represents individual's actions that can decrease his or her possibilities to react in the future, resulting in that level of distress can increase. Even though the connotation between 'positive adaptation' and 'coping strategy' is more preferable for positive adaptation, this does not mean that coping strategies would always be negative or short-sighted. Some changes require quicker actions, hence they are part of the coping strategy category, whereas in a wider picture positive adaptation is required to have longer standing changes. Distinction between these two categories comes from the element of time and individuals' reasoning behind chosen actions. Illustrative farmer quotations (Table 11) gives examples of each category.

For the THHs, responses are divided to female and male farmers. An individual can have applied more than one action, which explain why the total number of answers does not add up with the total number of farmers. However, numbers after the responses indicate how many of the farmers have performed the same actions. Numeric presentation of results does not mean that it would be representative in any matter and the results should rather be understood as forming a base for more in-depth analysis. Positive adaptation actions taken by female farmers in descending order are: improving farming with new resources (land or other inputs) (3), changing the seeds (2), and discussing problems and trying something new (1). Male farmers' responses were changing seeds or

crops (3), planting trees (2), and trainings and trying new ideas (2). For both genders, the core of the positive actions can be found in will to improve farming with more drought resistant crops. Two of the male farmers mentioned the importance of planting trees as a way to react to climate change. None of the women farmers mentioned increasing knowledge over agriculture as a way to react. An essential element for evaluating positive adaptation is that farmers can identify the problem and take counteraction.

Table 10. Female and male farmers' actions towards environmental and climate-related changes. Actions are divided into four categories: positive adaptation, coping strategy, passive coping and maladaptation. Each farmer can have had more than one action, which means that the total number of answers is higher than sampling size.

Positive adaptation	Coping strategy	Passive coping	Maladaptation	
improving farming with new resources (3), changing the seeds (2), discussing problems and trying something new (1)	using pesticide (6), using other sources of water (3) traditional knowledge (1)	avoiding responsibility (1), wait and see (1)	no responses	**female farmers** N=12
changing seeds or crops (3), planting trees (2), trainings and trying new ideas (2)	pesticide (4), using other sources of water (2), manure or fertilizer (2)	leaving to God (2), wait and see (2), no resources, no coping (1)	repaying loans with cattle (1)	**male farmers** N=11

Female farmers' coping strategies were dominated by using a pesticide (6), using other sources of water (3) and lastly using traditional knowledge for pest control (1). Male farmers' responses were similar, as most of them said their main coping strategy was to apply pesticide (4), use other sources of water (2) or use manure or fertilizer (2). All the above-mentioned coping strategies are based on resources and using *more* of them without making any specific alteration in farming methods. Therefore changes are temporal and require repetition. The only main difference between female and male farmers is that none of the female farmers mentioned manure or fertilizer as possible coping strategy. Applying pesticide was the most common way of reacting to changes.

Female farmers' actions that can be considered to represent passive coping were avoiding responsibility (1) and passive waiting for the situation to change (1). For male farmers, responses were leaving the problem to God (2), passive waiting for the situation to change (2) and claim that lack or resources prevents all the possibilities of coping (1). When compared to female farmers, male farmers used more often passive coping strategies. Passive coping strategies were most often the last action when individuals deemed the situation too difficult. However, as the gender division shows,

female farmers were reluctant to have passive responses. For maladaptation, there were no responses from the female farmers that could be interpreted as maladaptation. For male farmers, only one of the responses can be considered as causing maladaptation, as one the male farmers answered that sometimes he has to sell his cattle as a repayment for loans (1).

Table 11. Illustrative farmer quotes on positive adaptation, coping strategy, passive coping and maladaptation. (THH)

Positive adaptation
"Female farmer (f10): There is a change of rain patterns. The rain patterns are shorter than expected. *Interviewer: How do you react to these changes?* *Female farmer (f10): We are using a different type of seeds which takes shorter period to grow."*
Coping strategy
Male farmer (f27): "There are pests and drought." *Interviewer: "How can you cope with these changes?"* *Male farmer (f27): "Sometimes we use pesticide."* *Interviewer: "Is that the main way to react to these difficulties?"* *Male farmer (f27): "Sometimes they work and sometimes they do not."*
Passive coping
Male farmer (f21): "Sometimes we have the problem of deciding and then we leave it to God. If it is very complicated problem, we leave it to God." *Female farmer (f12): "There is no rainfall, so we have not planted everything yet, we are waiting for the rain. There are also many pests. Our hope is that when the rain comes, we are able to plant and the pests will go away"*

Male farmer (f26): "What I am saying is that in anything you want to do you need capital. When we go for creditors, we get credit and loan but the interest to bay back is so high. And normally they ask to bay back on time. If you fail to do so, they will come and take anything. They do not care if you suffer because of drought or pest infection. To them, that is not their issue; they only care about the money. They will come and take your livestock, they come and take all your furniture, all the water tanks you have out there. I lost also one of my dairy animals as a result of that."

For the SHHs, all of the participants reported different coping strategies that they applied in the face of changing farming conditions. Coping strategies were chosen mainly according to traditional knowledge or the advice received from the extension officers. However, the persons who did not have access to extension officers' trainings also performed progressive adaptation methods. Participants had also adapted to changes with making more permanent changes in terms of doing crop protection. Despite of the good coping and adaptation strategies, all of the participants also reported means of passive coping. Passive coping was related to unexpected changes with weather, unaffordability of pesticide or other farming inputs and strong will to farm despite the drought or other challenges. One of the participants reported waiting for the extension officers if faced with challenges with water or new pests and insects. In case of drought or not functioning pesticide, they would still farm and wait to see what happens as that was their only option.

Table 12. Illustrative farmers' quotation on coping strategies (SHH)

Female farmer (f27): "*Sometimes there is no money to buy the fertilizer so we just plant without and we might have very little harvest. These lands are not fertile. We are not fertile because we always dig in same spot and nowhere else to let the land rest. So the land needs this manure."*
Female farmers (f26): "We just [laughs]… You know it is the only shamba that we depend on. So even if it is not raining, and it is a dry season, we just plant and wait and see how it will be. We have no other option."
Female farmer (f25): "I avoid fertilizer because they are harmful for the soil so I use organic manure from the cow."

6.4 Contextual vulnerability and farmers' response strategies

Previous chapters have presented the results of the analysis focusing on elements of social and human capital and farmers' response strategies. In order to understand whether the contextual vulnerability in fact has any explaining value when analysing farmers' adaptive capacity, the following chapter connects these aspects. Social capital and networks, human capital and agency, and lastly farmers' response strategies are the layers, which are combined to see if there are certain elements that co-evolve and explain each other. In addition to these, contextual vulnerability analysis aims at covering other central socio-economic contexts, which co-evolve and explain the possibilities for evolvement of response strategies. In line with the already discussed results, the analysis will be separate for the THHs and SHHs presented in respective order. As a reminder, the analysis should be conceived as a way towards constructing new insights to the vulnerability discourse rather than as presentable presentations of the farmers' possibilities for adaptation and coping. To address the research questions, the analysis focuses on unfolding the context of the female farmers whereas the analysis of the male farmers' context is addressed more briefly.

All of the THHs' female farmers who reported positive adaptation strategies had elements that can be seen to represent high human capital and they also participated in social groups forming bridging or bonding social networks (N=6). Only one of the female farmers with high human capital and positive adaptation strategies did not participate in any social groups because of the high registration fee. Female farmers with the positive adaptation strategies all were from the elderly part of the participants, varyingly between 40 to 56 years old meaning that they had practiced agriculture a reasonable long time and gained experience and knowledge from it. This came apparent also from their employment backgrounds, which were dominantly focusing on agriculture. Only two of the female participants with positive adaptation strategies were either currently or had been previously employed off-farm as well. Common to all the six female farmers was that they all had slightly higher landholding size than an average smallholder farmer, which was approximately 2 ha. They all reported that their household had the title deeds to the land and it was inherited. Additionally, almost all of the female farmers' spouses were employed off-farm, which indicates better financial status for the whole household. Female farmers with positive adaptation strategies reported participating in social groups mainly for having access to information and loans, which can be seen as creating possibilities for positive adaptation. Most of the female farmers with positive adaptation strategies also reported shorter-term coping strategies, which exemplifies the variety of their possible responses. If analysed on the intra-household level, most of the female farmers' partners also applied positive

adaptation strategies, while one had only coping strategies and for one there was no information available. Interestingly, participation in decision-making process concerning agriculture varied. Despite their position, women were more likely to report deciding together with their husband whereas male farmers reported deciding alone even though their main employment might be outside the farm.

There were also female farmers who had the same positive characteristics of human and social capital but only mentioned response strategies that can be categorised as coping strategy due to their short-term effect (N=4). They all reported inadequate access to financial resources and farm inputs, which might be explaining the lack of long-term responses. All four female farmers' main employment was farming, whereas their partners had varying employment backgrounds. Common to all was that their participation to decision-making can be considered somewhat passive because of the tendency to follow seasonal changes, which means that a need to make decisions comes only seldom. Female farmers who only reported passive coping strategies were lacking some of the positive elements of human capital and did not take part to any social groups (N=2). Common for these two participants were their relatively young age, which explains partly their lack of confidence, which is a central element when determining positive aspects of human capital. Even though they were actively involved with farming, they felt being new in agriculture and relied rather on their spouses' opinions.

Despite having advantaged position in terms of high human capital, all of the THHs' male farmers did not respond to the changes with positive adaptation means. Male farmers who had high human and social capital, and bridging networks had implemented positive adaptation strategies (N=3). Likewise, the male farmers who did not participate in any social groups but had high human capital also reported positive adaptation strategies (N=3). For male farmers, the participation in social groups did not appear to be as important as for the female farmers. Reasons for taking part to social groups were mainly for gaining better access to market or for having access to information, but not participating did not mean automatically of not having possibility for adapting positive adaptation strategies. The male farmers with positive adaptation responses all had varying employment status. Only one of farmers was employed solely in the farming whereas others were employed either as casual labourers off-farm or were receiving pension due to previous employment. There were also male farmers who had both high human capital and reported participating in social groups but had applied only shorter-term coping strategies (N=3). Their employment status again was varying.

One male farmer had elements of high human capital and low social capital and reported coping strategies. One farmer, who had reported elements of high human capital but did not participate in any social groups, had only passive coping strategies. As discussed in the earlier chapter, many of the male farmers reported performing passive coping strategies but only one of the farmers reported only applying responses considered passive. This person was notable older and perceived challenges as irreversible and God-given.

When it comes to analysis of the SHHs, one notable difference was their tendency to rely only on traditional knowledge more strongly than participants from the THHs, who only used it as supplementary method. Simultaneously, they most often applied passive decision-making processes because they did not perceive it necessary as they could only follow the seasons and farming calendar. However, this might prove to be problematic with the changing climatic and environmental conditions, which oblige farmers to be more innovative. All of the SHH participants were from relatively older age. For coping of the SHHs, the most prominent factor was their lack of access to resources or income, which meant that they had few possibilities to modify their farming practices. Neither did they participate to social groups, which could have allowed them an access to the lacking resources. The SHHs are facing many challenges that often due to their high age, according to this research. They require assistance with the heavy work in the farm. Rely more on their own knowledge and experience rather than asking for a second opinion. When compared with the elderly people of the THHs, their position in the society is not as respected. This can be also due to the previous employment status which were higher among the THHs than with the SHHs. Of course, gender can be seen as an explaining aspect because all the elderly people from the THHs were male whereas with the SHHs all participants were female. In this research, none of the SHHs were male-headed, which either reflect their low prevalence or that they were not captured in this sampling.

6.5 Key informant interviews

Key informant interviews work as a threshold towards changing the focus from the household-level towards wider debate. After this chapter, the analysis will be completed with the results of critical discourse analysis, which will form the last level of analysis. Due to the limited number of participants, the interviews are regarded as individual opinions stated by the experts in agriculture sector. All the participants were asked the same core questions (Annex 2), which were accompanied by the questions concerning the persons in hand area of expertise and interests. Differing background means that interviews are not as easily comparable. However, they provide an interesting insight from the perspective of person working on the field. Key interest areas are elements, which create vulnerability, gender roles in terms of division of labour and access to resources, and measures that are meant for strengthening individuals' adaptive capacity.

When it comes to determining who are the most disadvantaged or vulnerable farmers, all of the key informants underlined the importance of having financial resources, which will allow access to other farm inputs. Despite of the varying background of participants, they all argued that income level is the most defining aspects when evaluating vulnerability of the farmers. Income level was often perceived to be connected to land size, as many of the key informants pointed out. As can be noted from the Table 13, land size also affects farmers' possibilities to diversify their food production because of the scarcity of space. Some of the participants also raised marginalised groups as the most vulnerable, which consist of widows, orphans and elderly people. Participants' opinions were more divided regarding accessibility of information. All of them argued that it is crucial for any farmer to be able improve their farming practices through trainings and by learning new methods, but their evaluation on how accessible these means are varied. Key informants argued either that the level of income can hamper individual's possibility to have access to information, or that the information is available and 'there', but the inadequate financial resources prevent farmers from implementing new strategies. Importance of information is the only aspect that can be considered to represent contextual vulnerability, whereas land size and questions of resources is another debate.

Most of the key informants argued that female farmers are taking a greater responsibility of farming, while male farmers are more interested about participating to casual labour or having other income creative activities. However, due to traditional gender roles, men often hold the ownership of resources and are more dominating in decision-making, according to one of the participants. The same key informant also argued that the female farmers are more receiving and adaptive when

introducing new farming practices (Table 14). One of the key informants argued strongly against the idea of vulnerable women because the challenges are always faced evenly as a household.

Table 13. Illustrative key informant quotes on vulnerability of the small-scale farmers.

Key informant (k3):"In terms of practicing inputs like pesticide, they cannot afford them. In terms of harvesting water, they cannot pay tanks and harvest the water for the drought periods. The small-scale farmers are the most vulnerable. They cannot even access fertilizer, they cannot afford them."
Key informant (k5):"Sometimes the challenge is space availability. Like when we say them to plant macadamia, which will take 5 to 7 years to grow, they will ask what I will eat in the meantime. Maize will take only three months to grow so of course they will plant that one. So the problem is land availability, because they do not have enough space for the trees and food crops. We are trying to make them to do terrace lines and to plant trees in these spots."

Table 14. Illustrative key informant quotes on gender roles

Key informant (k6): "I can say that the male farmers are dominating in terms of resources. Even if women are active and responsible for the farming the male is the one who is controlling the resources. It is according to the traditional roles."
Key informant (k6): "*Women are more responsible for food production. It is a cultural thing. It is easier to convince women to take up new methods than men. So if the farm is female dominated, it will more likely adapt new methods."*

The main adaptation strategies that the participants proposed were planting trees, trainings and different programmes targeting small-scale farmers. As noted already in the earlier chapter, the scarcity of space results in that farmers have few or no possibilities to plant trees on their land, even though they would eventually increase their income level and also benefit the climate in the bigger picture. Trainings conducted either by the extension officers or other stakeholders were considered useful and open for everyone. According to one participant, variety of available training and projects conducted by foreign actors is creating dependency syndrome, which means that farmers are getting used to assistance and they no longer go to the meetings where one cannot get any benefits. This is

also related to the political atmosphere on more general level. Another challenge that key informants emphasised was the politicisation of farmers' trainings or meetings. Especially during the political season of election campaigning, events might be perceived as political even though they would not be.

6.6 Setting a wider frame for climate change and agriculture discourse

The aim of this chapter is to connect the results of the empirical part of this research back to the wider climate change and agriculture debate. This is not a comprehensive analysis but nevertheless it is important to have a broader frame for a problem such as climate change, which is inherently global and local at the same time. Key policies for the analysis are agriculture and climate change policies produced by the Government of Kenya (GoK), which are Kenya Vision 2030: Agriculture Sector Development Strategy 2010-2020 (Government of Kenya, 2010), and Climate Risk Profile Taita Taveta County (Government of Kenya, 2016).

One of the cross-cutting challenges related to farmers' possibilities to adapt to climate change is the poverty-trap which prevents their access to farm inputs. This notion is central element when discussing farmers' vulnerability and main challenges in all the documents produced by the GoK. Poverty is more commonly linked to women, who have lower access to off-farm employment than men. According to the Climate Risk Profile of Taita Taveta County, farmers' ability to adapt new strategies is most restricted by the resource-constrains, lack of education and gender. To quote the document: *"Male-headed households are more likely to apply climate change adaptation strategies on their farms, given their higher access to productive resources, extension and training, and due to their higher decision-making power on household resource utilization compared to women and youth."* (Government of Kenya, 2016, p. 15). Some of the presented adaption strategies are value chain specific whereas other cut across. When compared with the empirical part of the research, both female and male farmers reported adaptation strategies, which are in line with the Climate Risk Profile even though the analysis was not value-chain specific. In this research, farmers mainly brought up on-farm options for adaptation strategies and more likely found the off-farm options inaccessible. Off-farm options require higher position either in terms of current or previous employment or good financial status. Climate Risk Profile also brought up the challenge of farmers' reluctance to take loans because of the negative perception towards them. This notion is in line with the comments of the key informants and some of the household interviews. In this research, the loan were accessible

through social groups rather than through institutions applied as an individual. Other challenges brought up in the Climate Risk Profile were *"Some cultural practices such as continued maize production, low fertiliser use, high dependency syndrome compounded with high poverty levels impair success and ownership of most of the programmes by the farmers. In addition, it was reported that for some programmes, coordination is inadequate, hence there is duplication."* (Government of Kenya, 2016, p. 21). It appears that extension officers' opinions are well in line with the risk profile whereas academics opinion is differing. For instance, academics value organic farming instead of high use of fertilizers and they did not mention the dependency syndrome.

Agriculture Sector Development Strategy is part of the four pillars for achieving the GoK's Vision 2030 (Vision 2030). Agriculture continues to play a central role in Kenya's economy contributing to the GDP and offering official and unofficial employment (Government of Kenya, 2010). The strategy takes note of the women's central position in the agriculture sector while arguing them to be together with the youth as part of the vulnerable groups. To quote: *"The majority of vulnerable groups, women and youth are to be found in Kenya's rural and slum areas. These groups lack employment, capital and, in some cases, skills. Poverty is a major challenge among these groups."* (2010, p. 71). Due to men's traditional position as heads of the households, the strategy states that they have better access to land, credit and extension services. To avoid failure of interventions, the strategy focuses on integrating gender issues and disparities into all the proposed interventions (2010, p. 81).

7. Discussion

Discussion is divided into four sections. The first section discusses the explanatory value of contextual vulnerability in relation to farmers' response strategies. Key strength of the concept is its emphasis on the individual level characteristics combined with broader context analysis. In order to evaluate the meaningfulness of applied concept, the chapter examines what possible insights can be formed on the basis of this research. Secondly, the discussion turns into an examination of gendered differences found in the analysis of contextual vulnerability as it forms the corner stone of this research. In order to base my criticism towards the gendered nature of vulnerability and climate change discourses, the chapter focuses on analysis of gendered differences found in the research in seek to understand how these structures take place. Thirdly, the constructed discourses from different scales are put together for achieving the full circle of analysis (for recap, see Fig. 7). Lastly, the analysis is completed with the evaluation of validity and reliability of this research in order to understand its position in scientific discourse.

7.1 Contextual vulnerability explaining adaptation and coping strategies

In this research, contextual vulnerability is primarily constructed from the elements of social capital and social networks, and human capital and agency. These elements can be understood as one context, which gets more explanatory value when it is reflected through aspects of socio-economic stratifications and other research context related elements, such as cultural and historic dimensions. Contextual vulnerability analysis combined with the farmers' adaptation strategies allows us to examine the value of the applied concept and level of adaptive capacity. Based on the presented results of this research, it can be argued that on the basic level, the differences were the most drastic between those farmers who implemented positive adaptation strategies and farmers who had only passive coping strategies or coping and passive coping strategies. The logical conclusion is then to argue that farmers with higher adaptive capacity can more likely apply positive adaptation strategies. Despite being in line with the theoretical background, this finding requires more detailed articulation in order to increase understanding of the role of the contextual vulnerability concept in construction of farmers' response strategies.

Good social capital can be argued to support evolvement of individual's human capital as it can increase understanding over agriculture through trainings, enhance individual's confidence over own

skills and thereby strengthen the sense over one's authority and role in a household's farming practices. In this research, despite of the relatively small sampling size, most of the farmers noted friends, neighbours or organized social groups as primary source of information. Farmers who participated in social groups most often also shared the information and felt that their knowledge is useful and valuable. To agree with Cassidy and Barnes (2012), the connectivity of a household tends to increase availability of response strategies. In some cases, high human capital through traditional knowledge or high age could substitute the lack of social capital and networks. Female farmers who applied only short-term coping strategies did not report participation to successful social groups, which indicates that in order to have long-term positive adaptation strategies, it was helpful to participate to social groups for increasing access to loans or information, which were essential resources for positive adaptation strategies. This can also be seen as an example of preference to minimise the individual risk of taking loans.

In this research, the importance of income and agriculture-related resources has been touched mainly through social networks and groups, as they can increase accessibility of otherwise too expensive farm inputs. Even though individual and society related characteristics can offer valuable information about the common response strategies, it is paramount to understand the role of resources as well. In this context, resources meant most often basic farm inputs, such as water and seeds, and if the income level allowed, also fertilizers and pesticide. On basis of this research, I agree with Mohan and Mohan (2002), who argue that despite the importance that social capital can have for an individual, it does not overcome complete lack of resources or income, which results in narrow bargaining set (as discussed in Van Aelst & Holvoet, 2017). Society's positive characteristics, such as trust and sense of reciprocal sharing, can enforce individual's characteristics, such as the sense of empowerment through gaining new knowledge and ability to make decisions. Two-headed households' farmers who were connected by bridging or bonding networks and had financial resources did not perceive themselves vulnerable because of the possibilities to react, even though they would have difficulties with resources as well. Farmers with fewer networks and resources also had coping strategies but they noted that most often they could not implement the ideas they had. In the context of the single-headed households, social capital and networks could substitute more notable existing lack of income and other resources. Therefore, it should be argued that social capital and networks especially through organised social groups can work as a way towards having more stable income level, when an individual can afford the registration fees. In case of more severe poverty, social groups are often considered too expensive and exclusive. If applied for adaptation programmes, the conclusion could be that to approach farmers who are in the most disadvantaged position, adaptation programmes

should aim at increasing those farmers' participation who are not already involved with social groups and who could not otherwise afford to register to such groups.

When analysing the possibilities and limitations for having multiple response strategies, the contextual analysis should always be reflected through broader scale societal processes, as Eriksen et al. (2005) argue. Individual's access to resources is not only limited by her or his own assets, but also depends on availability determined by the markets (ibid.). Geographic scale in terms of location and connections determines the accessibility and prices of the resources. In this research, many of the farmers and key informants argued that unaffordable prices of the farming inputs are partly due to high transportation expenses. As noted already in the research context, Taita Hills and its towns are located in higher altitudes, which means that farm inputs such as manure, fertilizers and seeds are transported from the lower areas, which increases the prices. This can be seen working as an example of the structural constraints which are created on concrete, environmental condition but also on national and international scale through politics and markets. Contextual vulnerability analysis can work as perspective that aims at understanding essential structures determining farmers' response strategies. Through this concept, it could be possible to examine which individuals are in vulnerable position rather than automatically connecting vulnerability as a generalizable characteristic to the certain groups of people, like women and youth. If the vulnerability discourse would address vulnerability as a disadvantaging position, the discussion could include other nuances and agencies more easily. As Taylor (2015) concludes, climate change as a discourse affects the institutional practices and knowledge productions, which ultimately frames the way people are responding to socio-economic changes brought by climate change and variability.

7.2 Gendered differences of contextual vulnerability

Contextual vulnerability along the socio-economic factors frame individual's possibilities and limitations for having both short- and long-term response strategies. As discussed throughout this research, the question of how much gender shape these possibilities has been in the centre for analysing contextual vulnerability. Gender, understood as a social construction that can increase structural inequality, has been examined in terms of research questions, constructing and analysing of the data. Because the very nature of contextual vulnerability aims at dismantling structural and context-specific challenges, it is well argued to emphasise how gender as a structure should always be reflected when performing contextual vulnerability analysis.

As can be noted from the results chapter and earlier discussions, social capital and networks can have a great role in strengthening individual's response strategies. According to this study, however, it appears that social groups have more meaning for THHs' female farmers than for male farmers when it comes to improving farming through social capital and networks. The effect of the strong social capital and social networks is two-folded. Firstly, the social groups or bonding networks can offer an opportunity to have access to loans or resources that would otherwise be hard to get. Despite the fact that this aspect is equal for men, female farmers most often do not have any other sources of income except farming, which means that for them, group loans and sharing of resources is highly important. Secondly, participation in the social groups can work as an opportunity to learn how to recognize one's own talents and value of their work, which in turn can have empowering outcomes for any individual regardless of the gender. Young female farmers who did not participate to social groups tend to downplay their participation in farming when asked directly. But when it came to describing their response strategies or sharing information with their friends, they often brought up the willingness of demonstrating their successful farming for their friends, which contradicts their earlier description of their limited working duties. For female farmers, age seems to be a defining aspect of how confident one is regarding her own skills and knowledge, whereas both young and old male farmers always appeared confident about their role in farming and decision-making.

Decision-making power is often considered to work as an indicator of empowerment and individual's agency. Many references state that women are largely deprived of participating to decision-making process regarding agriculture practices or usage of resources. However, as can be noted from the empirical part of this research, many of the female farmers reported participating in decision-making either by together with their spouse or alone. This can reflect that women are actually participating more than it is often assumed or that in this context, women have higher position in the society which explains their strong participation. This could also be explained with the migration trends, where men have often moved to other places in search of employment giving women the main responsibility over farms (Smith, 2008).

Both with female and male farmers, participants who argued deciding alone were always closely involved with farming. Despite of the central role in farming, most of the female farmers noted that they cannot make decisions without consulting their husbands whereas male farmers did not report the same obligation. Consultation does not diminish one's authority, but it can be problematic if it is not reciprocal. Another gendered difference in relation to decision-making was the male farmers' tendency to rely on passive decision-making in case of severe difficulties. For female farmers, the

passive decision-making was more related to following the seasons or traditional knowledge, which releases them from a need of deciding. As in other similar studies, the extent of social networks and knowledge can lead to proactive decision-making whereas passive decision-making can be a result of relying on experience and safe decisions (for example, Singh et al., 2016). Passive decision-making that bases on traditional knowledge of seasonal changes can be problematic in the face of climate change and unpredictability of weather conditions. Due to changing conditions, farmers are required to not only change their farming practices but also the way their base their decisions. However, it should be noted that decision-making within a household as a research topic is diverse and complicated, and therefore it is obvious that this research only grasps a small fracture of the whole process. It reflects the bargaining power of individual's, which in turns affects how new information or response strategies are perceived when presented by a female or male farmer in a household. Because of these implications, decision-making processes should always be acknowledged when performing contextual vulnerability analysis.

Gender roles and structures should always be examined in a broader historical and cultural context to form full understanding of the current day issues. As discussed earlier, farms and households have traditionally been perceived as manifesting male effort and success due to ownership and inheritance of land and other assets. It has also been a tradition for women to move into their husband's home. In this research, this came apparent in some of the interviews, even though it was not directly asked. Apart from the single headed households' female farmers, all the farmers reported that their land was owned by the family, which in this context could be taken to refer to a husband's side. However, women perceived themselves as responsible for farming and performed notable amount of the work sometimes being alone in charge of the farm, which demonstrates strong ownership. In this research, land tenure did not seem to be a determining aspect when analysing female and male farmers' response strategies.

Another central historic aspect is Smith's remarks about NGOs and CSOs' tendency to favour women in terms of choosing direct beneficiaries or main target groups for development programmes (2008, p. 199), which has arguably undermined men's role as single heads of households due to women's improved financial status. Smith argues that because the government's role in agricultural development was not functioning well, people pursued assistance from NGOs and other actors. Smith's research resonates with today's situation, where foreign development programmes are still perceived more desirable than county's programmes and trainings, as some of the key informants pointed out. Foreign NGOs and their programmes can alter the power structure undermining the

importance of local chiefs and representatives of the County, although this notion remains open for debate due to lack of context related research.

Even though spouses reported sharing of the information and resources, their response strategies could be largely different. According to this research, female and male farmers working duties were not that notable different meaning that the explanation cannot simply be the different structure of working duties and challenges within these differing tasks. Positive adaptation strategies varied slightly between practice- and resource-based strategies. Many of the female farmers aimed at improving the crop yields by better inputs, such as drought resistant crops and seeds, whereas male farmers' adaptation strategies were more involved with changing the farming practices, such as applying crop protection. Male farmers also valued having access to the markets. This could be seen as representing a different mind-set towards farming in this research context. Male farmers could be argued to regard farming more as a mean for having income for the household, while female farmers comprehend farming through achieving the level of food production, which is sufficient for the household consumption and leaves something for the selling as well. When reflected through gender roles, this could represent men's perceived role as the main earners and women's perceived role as responsible for securing food for a household. When analysing the results on a household level, it can be argued that positive effect of high social and human capital were related to individuals rather than households. In other words, it was not enough to have a spouse participating in social groups or having good knowledge of agriculture because it did not always increase the response strategies of the whole household. However, if the female farmers had positive adaptation strategies, most of their husbands also enjoyed elements of social and human capital, and where not perceived as vulnerable in the contextual vulnerability analysis. If the household's income level is high enough, both of the spouses could participate in the social groups which require registration fees. If the level of income was not sufficient for both of the spouses to participate, a male farmer was most often the one to be involved with groups with registration fees, whereas a female farmer would not be the primary person to take part to groups. This can be argued to reflect how men might perceive themselves to be alone the head of a household in terms of bringing income and information for the household.

7.3 Framing a synthesis of global and local discourses, broader perspectives

Both the secondary and primary data has worked as a way towards improved understanding of the prevailing vulnerability discourses and towards constructing alternative discourses. This research has

demonstrated that the narrative of vulnerable women does not fully reflect the agency of female farmers, whose response strategies are not that different than male farmers. Even though there are difference in terms of elements of contextual vulnerability, female and male farmers are nevertheless facing the same challenges caused by the climate change. These differences do not turn women into being vulnerable, but rather underlines the structural elements of inequality and prevailing gender roles. Scientific and policy level discourses and the narratives, which they encompass, determine the way how international and national actors describe and understand the farmers' realities, which can prevent them from seeing stories that differ from the main discourse. Contextual vulnerability analysis takes into consideration individual's and society's characteristics and socio-economic aspects, which take place in cultural and historical structures. Contextual vulnerability analysis can help to locate the root causes that are preventing farmers to implement response strategies, without deeming their challenges solely person-related. As Ionescu et al. argue (2009), many of the vulnerability assessments are lacking the understanding of the local context and rather seeks to resolve the depicted problem with top-down approach. With contextual vulnerability analysis, this problem can be removed as the focus is more scale-sensitive.

Taita Taveta's Climate Risk Profile (2016) states that male farmers have higher access to resources, and they have a stronger position in decision-making processes, which contributes to their stronger adaptive capacity. In line with this statement, also key informants from the County sector argued that male farmers are in better position in terms of having multiple response strategies. These discourses are in line with the broader discourses regarding vulnerability to climate change. However, according to this research, both female and male farmers are capable of applying different response strategies either on the short-term bases or with the longer-term goals. Despite of the gendered differences in access to resources or elements of contextual vulnerability, both male and female farmers' adaptive capacity was paramount for a household's food production. In this context, female farmers were central actors and therefore their agency should be better acknowledged rather than contributing households' adaptation only for male farmers. Discourses regarding male farmers' adaptive capacity reflect the reality, but if female farmers' role is not articulated more thoroughly the narrative is biased. Discourses matter and shape the way reality is described, as can be seen from the continuous story of vulnerable women, which begins on the global level and is strengthen on the County level as well. Many of the key informants acknowledged women's role in the agriculture sector but also argued that they remain vulnerable in terms of having poor access to resources or information.

Climate change and vulnerability towards it are not isolated issues but rather have a cross-cutting position in development discourses on broader scale. Following this, also the adaptation concept is highly related to development even though its definition and role is not as well articulated as development goals, such as UNDP's eight Millennium Development Goals (MDG). As Cannon and Müller-Mahn concludes, climate change is affecting pathways to development, which is turn has an effect on development policy and discourses (2010). Constructivist perspective towards climate change and development policies allows us to examine what social relations and embedded power structures shape the negotiation of appropriate responses to depicted challenges (ibid.). If the political nature of adaptation is not examined further, the complex root causes of vulnerability might go unnoticed keeping the situation in status quo, as Taylor argues (2015, p. 7). He continues that one possible solution for this problem can be found from relational political ecology, which emphasizes the relations between different stakeholders and groups within individuals' vulnerability or adaptive capacity gets determined. This notion seeks to move the focus from the individual's properties or qualities and address the social relations and structures instead (2015, p. 9). Contextual vulnerability concept could work as a way towards diminishing the 'vulnerabilisation' of individuals, which is one of the main critiques of the field. Contextual vulnerability as a concept is rooted in economic and political discourses, which are seen to determine along society's and individual's characteristics the possibilities for adaptation. Due to this in-written interest towards contexts and structures, contextual vulnerability as a concept can function as a tool for diversifying vulnerability discourses. Because of the actor-oriented perspective of contextual vulnerability concept, analysis could also aim at softening the division between 'lay' and 'expert' knowledge, which is always present in discourses and knowledge construction even though individuals often apply both traditional knowledge and external information (Whitfield, 2016).

Climate change is not only affecting agriculture sector, but it is also causing broader scale climate conflicts. Contextual vulnerability analysis could have further applications for political ecology either from the perspective of analysing agriculture's role in climate conflicts or by applying the concept for analysing the root causes of climate conflicts. Interestingly, political ecology can be lacking the gender aspect, even though it should be fully internalised as a starting point for analysis because of its strong relatedness to structural challenges of inequality (for example, Okpara et al., 2016; Abrahams & Carr, 2017). In this research context, climate conflicts have not been actualized but this notion should not be regarded as impossibility due to agriculture sector's centrality for Kenia's development, both in economic and social terms. This context centric approach can reveal nuances of the complex reality, whether in the context of vulnerability to climate change or applied in climate

conflicts research, as Okpara et al. propose (2016). Unpredictability and accelerating nature of changes in climate and environment only underline the importance of properly understanding the structures where these changes are taking place.

7.4 Validity of this research and limits of the applied concept

Validity in a qualitative research refers to appropriateness of the research design, which in other words means that it reflects how sound the conducted research is in terms of applied research methods and analysis of materials. For post-structuralists, the validity of research comes from researcher's reflectivity towards her or his own work throughout the whole process. By displaying the shortcoming of the method and limits of the applied concepts, this research can be seen as part of the scientific discourse where the researcher's position is regarded as an important definer for the validity of work. Internal validity of this research can be argued to be well established in terms of achieving required results in respect to initial research questions. However, the size of the sample is notable small when compared to the variability and population characteristics, which keeps the external validity in terms of generalisation of the findings low. Despite being a shortcoming, achieving generalisable results was never the aim of this research and it was underlined throughout the work leaving now misunderstandings for the readers. Aim of this research was to concretise the biased nature of vulnerability to climate change discourses. Through discussion of female and male farmers' experiences and response strategies, this research could demonstrate how the vulnerability discourses can be lacking many nuances, especially from the point of view of gender. The applied research methods can be therefore considered appropriate for the initial research questions because of the relevant findings of this research. Research design can be argued to support emancipatory knowledge constitutive interests because of its critical focus on gender-related power structures. Thorough framing of the research concepts prevents from construing the topic and achieved results differently, which ultimately increases the credibility and trustworthiness of this research. This should be considered to be especially important in a vulnerability research because of the concept's inherent vagueness due to its wide range of existing theories.

To achieve a full evaluation of the contextual vulnerability concept, it is paramount to examine the limits of the concept. Contextual vulnerability conveys the idea that different contexts determine individuals' possibilities for applying response strategies, which ultimately dictate their level of vulnerability in the face of climate change. Vulnerability as a concept has inherent power structures

regardless of the applied concept. Even though intentions and reasons behind the analysis are practical and often highly needed, it does not out-write the hierarchical global gaze, which is common in science but nevertheless problematic. In this context, global gaze refers to tendency to present the Global North as actively solving problems of the Global South. Similarly, the hierarchical understanding could be seen in female farmers' passive and often victimised global image. This research aim is to bring more nuances to prevailing stories. However, also this perspective can be questioned from the perspective of white saviorism. Despite the good intentions, it is highly important to understand what are the underlying reasons for conducting research, as these questions are essential ethical issues. Any researcher working in the field of development studies should always aim at addressing this problematic nature in order to truly reflect their research's value and position in the scientific world. Smith (2008, p. 4) argues in the same sense that *"Development is particularly interesting because it is a relational concept that entails comparing one's condition to an ideal representation of other places and times to explain and measure circumstances and actions."*. The vulnerability concept feeds into the concepts of climate change and food security, which are more straight forward but also entail certain hierarchies.

One of the interest areas of this research was to unfold intra-household level differences in terms of contextual vulnerability and response strategies. The interviewed households were divided simply according to the number of heads of households, i.e. two-headed households of single-headed households. Division was not done according to the gender of a head of a household as it is commonly accustomed to do, i.e. female- or male-headed households. This division was applied because the interviews did not address who exactly the head of a household is leaving it impossible to determine afterwards. This structure allows to question gender hierarchies within a household, as it examines gender dynamics without deeming one of the spouses to be in a higher position. However, it should also be questioned whether this kind of structure in fact creates false equality between spouses. In this research context, head(s) of a household were determined by the interviewed family themselves, and not by an outsider. It could be argued that this kind of research structure allows a researcher to try to examine gender dynamics without pre-formed assumptions about participant's authority or role in the family.

8. Conclusion

Throughout this research the focus has been on analysing the concept of contextual vulnerability on the discourse level and on the concrete level through smallholder farmers' interviews. One of the key interest areas of this research was to depict the smallholder farmers' response strategies through gender analysis. Gender analysis was applied with the purpose of examining whether the female farmers are de facto more vulnerable than the male farmers, as it is commonly stated in the vulnerability discourse. It is often implied that due to the structures of inequality, women are lacking possibilities for adapting effective response strategies, which results in the prevailing narrative of vulnerable women. For addressing the presented research problem, the analysis applied the concept of contextual vulnerability which allows focusing on the socio-economic contexts and the social structures, such as gender roles. Gender roles were studied through the intra-household level analysis of farmers' food production related responsibilities and response strategies. By connecting the analysis of elements of contextual vulnerability to the farmers' response strategies, it was possible to evaluate the value of the applied concept.

The contextual vulnerability concept works as a way towards more comprehensive understanding of the construction of response strategies and localizing unharnessed options to increase individuals' possibilities in the agriculture sector. If the aim of a vulnerability assessment is to produce a description of a working environment or context for practicing adaptation programmes, then the analysis should take into consideration aspects related to contextual vulnerability. However, this does not mean that elements of outcome or end-point vulnerability analysis would be irrelevant, but rather underlines that without understanding of the socio-political and historical context and existing social structures, the outcome might not reflect the nuanced realities and therefore fail to fulfil its initially purpose: ensure that agriculture practices are viable despite the climate change. In other words, end-point vulnerability assessments can localize the hazards and environmental challenges, whereas contextual vulnerability describes the social structures and contexts where exposure to the depicted changes are taking place. In this context, the focus has been only on the agriculture sector, but this notion can be applicable to other lines of vulnerability research as well. The contextual vulnerability concept works in the interface of the adaptation and vulnerability concepts because of its focus on the root causes and elements of adaptive capacity. Because of this location, it should claim a more central position in the vulnerability to climate change discourse.

Vulnerability to climate change is intrinsically a discursive concept, which aims to present concrete realities of individuals who are facing the effects of climate change. These two layers are bound to be in conflict because of the complexity of the real world and the aim of conceptualising in the scientific discourses. These conflicts represent the gaps between the analysed layers, which in this context were misrepresentations of female farmers' low adaptive capacity and lack of possibilities to have response strategies. Although this research does not claim that women's position would be equal to men in terms of access to resources or social groups, it does emphasize that these differences do not diminish female farmers' ability or strong commitment to adapt to climate change. Some of the presented problems in vulnerability discourse are rooted in its tendency to apply the concept of outcome vulnerability. If the focus is only on the environmental aspects, the analysis might fail to acknowledge the gender roles that are differing from the global discourse and therefore solemnly assume that female farmers are simply vulnerable without any other agency. Vulnerability as a concept and a term should always be understood to be part of the wider political discourses, same as the concepts of mitigation and adaptation, which both are embedded in much broader power structures and agendas from differing scales.

One of the main goals of the contextual vulnerability analysis was to understand the role of social and human capital and how these two dimensions are connected to farmers' possibilities to cope and adapt. To some extent, social groups and networks can substitute for the lack of resources through having access to loans or sharing of resources between friends or neighbours, but it is only a partial alleviation. In this research, many of the farmers reported knowing resource-based coping strategies, which they could not implement because of the unaffordability of the inputs. This came especially concrete through the analysis of SHHs' responds, where some of the participants could neither have access to the required inputs nor alleviate the problem through social groups due to their high registration prices. Addition to social and human capital, it was also apparent that farmers' response strategies also reflected the threats that they were facing, in other words, sometimes it was important to have quick but short-term coping strategies whereas more graduate changes require longer adaptation strategies.

Social capital and human capital were also relevant for the individuals' decision-making process. Farmers with the wider social networks, regardless of gender, where more confident in terms of making active and pro-active decisions. Farmers whose decision-making was mostly passive relied strongly on traditional knowledge. The question of traditional knowledge is truly important and goes beyond this research. In the face of changing climate conditions, traditional knowledge is not as

reliable as it used to be while many smallholder farmers still continue to base their decisions on it, which can put them in a vulnerable position. Another central element related to the decision-making process was male farmers' tendency to highlight their role in decision-making. Male farmers often argued to be the main decisions makers concerning the resources and response strategies, but in terms of actually performed adaptation or coping strategies this statement did not become concrete, as the female farmers quite often made the decisions regarding their working responsibilities. This could present male farmers' perceived role as heads of the households through the traditional gender structures, even though it does not resonate with the reality in a same way as it used to. Decision-making process per se is a complicated and multidimensional research topic. In the scope of this research, only few aspects could be covered but they worked as a valuable in-sight to inter-household bargaining and gender roles. For further research, the focus could be to elaborate more carefully how the smallholder farmers' perception of their role in a decision-making process can reflect their agency and level of adaptive capacity.

Climate change will bring notable changes for the agriculture, which is a central sector in terms of rural development and development in general. As such, agriculture is also one of the main causers behind the climate change, which is a notion that can go overlooked if the focus is solemnly on increasing the growth of the agricultural production. Sustainable development goals can work as a one possible solution. Even though this research is not addressing the ecological justice, the responsibility of applying environmentally friendly agriculture practices should not be alone on the smallholder farmers' shoulders. The same argument can be placed against vulnerability discourse, where the aim of decreasing vulnerability focuses mainly on its symptoms rather than on addressing how the disempowering structures were constructed in the first place. The contextual vulnerability concept together with the gender analysis creates an opportunity to move beyond immediate symptoms towards root causes that take place on different scales. In this sense, it can be more useful to think vulnerability as a position or context, rather than combining it to individuals or groups. As noted earlier, this research does not however claim that end-point or outcome vulnerability assessments would not be useful, but rather addresses the possible limitations of these assessments tools which could be overcome with the contextual vulnerability assessment. Moreover, if the vulnerability assessments do not consider the gender dynamics, the adaptation processes both on the policy and implementation level can get paralyzed by the vulnerable women narrative, which undermines their agency.

The contextual vulnerability concept is structured on somewhat difficult elements concerning individual's and society's characteristics. In order to be more comprehensive and comparable, these elements should be framed more carefully. However, if the idea is to analyse context-related elements, then the aim should not be to perform a standard form analysis, which could leave essential local dimensions out of a research. Contextual vulnerability as a concept is inherently multidimensional but that should be regarded only as its strength, even though it would mean that the results from the contextual vulnerability analysis would not be as easily comparable. Despite its complexity in terms of covering many different elements, there were also some aspects that were not considered. In this research, the location was not taken into the analysis but for the further studies, this factor should be also examined. In terms of having access to the social groups, the distant location can work as a hampering factor, especially for the elderly people. This aspect came up in some of the interviews even though it was not asked directly.

Vulnerability assessments are often perceived as the counterpart for adaptation analysis. From this perspective, it could be argued that contextual vulnerability as a context-focused concept could function more naturally as a way towards having well-functioning adaptation programmes. However, despite the promising results from this research, the value of the contextual vulnerability concept remains open for debate due to relatively little attention it has had so far in the vulnerability research. In order to truly understand its possibilities, the concept should be taken into focus of vulnerability research. If the aim of the vulnerability assessments is to produce more context specific information for adaptation programmes, the focus should be moved from construction of vulnerability indexes towards analysis of social contexts. Vulnerability as such will most likely remain to be a much-debated concept, but it does not excuse researchers who are using the concept from not acknowledging its political and power-related aspects. These aspects take place in the different levels of discourses having concrete effects on both female and male farmers. Therefore, it is important to understand the value of the discourses and narratives even though the topic itself would seem mostly environmental. This research works as an example of how important it is to understand the impacts and meanings of discourses, as they can construct a perspective of the world, which does not truly reflect the reality anymore. Only by understanding the power structures and misrepresentations that the concepts can have, we can start dismantling the root causes of vulnerability.

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Appendices

Appendix 1: Household interview, question survey

University of Helsinki, Department of Geography and Geoscience
Master's thesis topic: Vulnerability to Climate Change – Gender analyses of smallholder farmers' contextual vulnerability

Contact information: Maiju Palosaari, maiju.palosaari@helsinki.fi, phone number: 0719750971 (until 10.3.2018)

Contact information of the supervisor: Tino Johansson, tino.johansson@helsinki.fi

Stakeholders in the agriculture sector, key points for the introduction:

- Why to participate
- Introduction
- Confidentiality
- Important to consider
- Questions types
- The interview will take maximum of 1,5 hours
- The final paper will be found in Taita Research Station of the University of Helsinki.
- In case you have any questions, you can ask during the interview or afterwards
- Thank you for the opportunity to make this interview with you
- I am going to record the interview just in the purpose of being able to work with it afterwards. I am the only person who is going to hear it.

1. Background information

Participant's surname:
Contact information: (phone number)
1.1 Gender: woman / man / no answer
1.2 Age: 20 – 30 / 31 – 40 / 41 – 50 / 51- 60 / above 60
1.3 Family relations:
    1.3.1 How many persons is living in this household?
    1.3.2 Could you tell me about your family members?
    1.3.3 How many persons take part to farming practices?
1.4 Employment status:

1.4.1 What is your main source of income: farmer / seller / employee for an organization / county government/ central government/ something else, what:
1.4.2 Have you been / Are you being employed for some other sector:
1.4.3 Does your household have some other sources of income? Spouse/ family / children / ?

1.5 Access to land: owner (title deed, official) / owned by my partner / owned by my family (unofficial) / renting / unknown / something else, what:
1.5.1 Size of the land (estimation):

1.6 Education level (the highest level of education completed / participated):
Less than primary / primary / diploma / secondary / technical or vocational / university of above / something else, what:

2. Activity profile

2.1 Could you describe me your normal workday? (Is there something else?) Starting in the morning, seasonal changes can be described if you wish to.
2.1.1 How much time do you spend on each task?
2.1.2 Out of these activities, what is the most important one?

2.2 Could you describe me your husband / wife's normal workday?

2.3 If you think about the responsibilities that you mentioned (quick revise from question 2.1), what kind of resources do you need for these tasks? (For example, water, seeds, fertilizer, herbicide)

2.4 Do you have an adequate access to all the resources? (Adequate=enough)

2.5 Do you have control over those resources? Do you decide alone how they are used?

2.6 Do you have some income creating activities in your household?
2.5.1 Yes, what kind of activities:
2.5.2 How do you normally spend the extra income?
2.5.3 No, what is the main reason for not having any activities?

3. Social networks

3.1 Are you participating in any social group, such as an association, self-help, co-operative?
Yes, in one / Yes, in many / No
3.1.1 If yes, could you describe the group(s)? (Farming, marketing, religious, women only, credit, sacco, self-help, information channels about tools or such)
3.1.2 What is the most recent event that you have participated?
3.1.3 Why did you choose to participate to that group?
3.1.4 How did you hear about the group?
3.1.5 If not, what is your main reason for not being involved in any group?

3.2 If you want to learn or try some new farming methods, what is your primary source of information?
Family / spouse / friends / media (radio / TV/ newsletter) / internet / social group / county / extension officers / chief's baraza / none / something else, what:

3.3 Following the previous question, if you have learned some new information about weather/agriculture, whit whom do you talk about it?
… friends (male, female, both) / family / spouse / no one / someone else, who:
3.3.1 If not, what is the main reason for not talking about it?

3.4 Do you give advice about farming for other persons? For who?

3.5 Do you think people listen to your advice? Why?

4. Defining vulnerability in the context of agriculture and climate change

4.1 Within your farm or close areas, what is the biggest change in environment or climate that affects your agriculture practices? (Increase in temperature, drought, change in rainy seasons, new insects or diseases)

4.2 How can you react to those changes? Do you have some kind of coping tools?

4.3 What is the main reason that prevents you from reacting to these changes?

5. Decision-making within agriculture practices

5.1 If you think about your work responsibilities (Activity Profile), how would you describe the decision-making process?

(My family decides, my partner decides, we decide together, the community decides / no decision-making)

5.2 What about the resources, who decides how they are used?

5.3 In which situation do you feel like it is hard for you to participate into decision-making process?

(For example, when you decide on division of labor, income using, and such)

5.4 If there is a sudden change or risk in environment or climate, how do you decide on coping strategies? (My family decides, my partner decides, we decide together, the community decides / no decision-making)

6. Anything else?

Is there anything else you would like to add?

Would you like to go back to any of the previous questions?

Many thanks!

Appendix 2: Key informant interview, question survey

University of Helsinki, Department of Geography and Geoscience
Master's thesis topic: Vulnerability to Climate Change – Gender analyses of smallholder farmers' contextual vulnerability

Contact information: Maiju Palosaari, maiju.palosaari@helsinki.fi
Contact information of the supervisor: Tino Johansson, tino.johansson@helsinki.fi
Representatives of an organization or county sector
Key points for the introduction

- Why to participate
- Introduction to the topic
- Confidentiality
- Important to consider
- Questions types

1. Background information

Participant's name:
Contact information:
1.1 Gender: woman / man / no answer
1.2 Age:
1.3 Employment status (one or more):
Main source of employment: farmer / seller / employee for an organization / county government/ central government / something else, what:
Secondary source of employment (if applied): farmer / seller / employee for an organization / county government / central government / something else, what:
1.4 Education level (the highest level of education completed / participated):
Less than primary / primary / diploma / secondary / technical or vocation /university of above
1.4 Could you describe your work responsibilities, areas of expertise?

2. Activity profile

2.1 Could you describe an average work day of a male farmer? What are the main responsibilities? (Cash crops, food crops, fish bounds, livestock, land preparation and so on)
Examples from the same agroecological zone as Wundanyi is representing. (Name the areas)
2.2 What about a female farmer?
2.2.1 If not, why cannot you describe the work days?
2.3 If thinking about different responsibilities, what are the main resources?

2.3. 1 Is there an adeaquate access to these resources?
2.3.2 Access to resources?
2.3.3 Who has the control over the resources?

3. Defining vulnerability in the context of agriculture and climate change

Vulnerable: Not being able to react in a way one would want, not having enough resources (illiteracy, inability to react, lack of resources)
Climate change: increase in temperature, instability in rains

3.1 What is the biggest change in environment or climate that affects local agriculture practices?
3.2 With your experience about the agriculture, when could you feel yourself vulnerable to climate change?

4. Climate change adaptation means and adaptive capacity

4.1 What kind of climate change adaptation projects your organization currently have in local areas? Same agroecological zone as Wundanyi is.
4.2 What kind of awareness raising (capacity building) projects or means do you currently have in the local area?
4.3 Do you have in projects that support social networks? Networks that support climate change adaptation.
4.4 If thinking about your work, what kind of criteria you have when deciding who is eligible to participate in a project or receive some benefit? You can give examples from the projects, awareness raising and social networks individually, if criteria differ.
4.5 Are you targeting farmers as a household unit or individually men and women? Why is that? Are you aiming at increasing co-operation within a household?
4.6 If you think about all the stakeholder, for example from organization, county and sub-county level and academia, how would you describe co-operation between those groups?

5. Anything else?